FLORA
OF
THE INDIANA DUNES

PUBLISHED BY
FIELD MUSEUM OF NATURAL HISTORY

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FLORA
OF
THE INDIANA DUNES

A HANDBOOK OF THE FLOWERING PLANTS AND FERNS OF THE LAKE MICHIGAN COAST OF INDIANA AND OF THE CALUMET DISTRICT

BY

DONALD CULROSS PEATTIE

FIELD MUSEUM of NATURAL HISTORY
FOUNDED BY MARSHALL FIELD
1893
CHICAGO

PUBLISHED BY
FIELD MUSEUM OF NATURAL HISTORY
CHICAGO, U. S. A.
1930

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Field Museum of Natural History

PRINTED IN THE UNITED STATES OF AMERICA
BY FIELD MUSEUM PRESS

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Figure No. 3 is from a photograph by J. R. Millar; No. 16 from a reproduction in the Hall of Plant Life in Field Museum; Nos. 21, 27, 28, 37 from photographs by Huron H. Smith; Nos. 22, 23, 30 from photographs by Frank M. Woodruff. The photographs from which the other illustrations are made were received from L. W. Brownell.

PREFACE

A Flora of the famous dune country of the Lake Michigan coast of Indiana has long been needed, and now that a part of the region has become a public wild-life preserve and recreation ground, while at the same time the growth of industrial cities in another part of the region has destroyed and will continue to destroy a unique plant life, the time seems ripe for making a botanical record, as well as a guide to the flora. As a botanical record and as a guide the present volume is not complete, even with its inclusion of somewhat more than 1,300 species of flowering plants and ferns. The endeavor has been to make it so, but the flora is undergoing rapid changes, nor is it given to anyone to obtain a complete knowledge of the flora of an area. The writer has spent seven years of collecting and of work in herbaria in the preparation of this volume and has examined practically all the specimens from this region in Field Museum in Chicago, the largest collection of Dune plants, as well as most of those in the National Herbarium at Washington, D.C., in the Gray Herbarium of Harvard University, and in the herbarium of the Chicago Academy of Sciences.

Beside this work of his own, the author has had valuable assistance from Dr. Frank Gates, Mrs. Agnes Chase, Mr. Willard N. Clute, M. W. Lyon, Jr., and the Hon. Joseph Churchill, who have courteously provided him with lists of their collections, and forwarded specimens for verification. Dr. Norman C. Fassett has offered excellent suggestions.

There is a considerable but scattered literature on the systematic botany of the dune country. The first tentative list was published by Dr. Henry Holmes Babcock in *The Lens*, followed by Higley and Raddin's more ambitious list published as a *Bulletin of the Chicago Academy of Sciences*. This has just been brought up-to-date by H. S. Pepoon's "Flora of the Chicago Region." E. J. Hill for nearly twenty years published critical notes on the region, in addition to the more literary sketches elsewhere alluded to. And Dr. J. A. Nieuwland in the *Midland Naturalist* began an uncompleted catalogue of dune plants, while Dr. Lyon published a brief list of Porter County plants and their soil preferences in an *Annual Report of the Indiana Academy of Sciences.* He followed this recently with a comprehensive list of Porter County plants in the *Midland Naturalist.* All these reports have been gone over and sifted down; where no specimen has been seen by the present writer to support a reported species the fact is noted; many species have been reported which certainly never grew in the area of this work. Where the mistake was a casual error it has been passed by without notice in this work; where the error was due to changing views of species, notice is made.

The nomenclature of this work endeavors to accord with the International Rules of Nomenclature, and to keep abreast of the chief taxonomic changes and monographic revisions that have occurred since the appearance of the seventh edition of Gray's "Manual of Botany." Yet not every supposedly earlier name which someone has proposed for exhumation has been adopted. To do so would be to drift with every slight current of change. Where a well-established and clearly applied name is in use, it has in most cases seemed to the author to render a bad service to science to suppress it in favor of an earlier name where such a name was obscure or of doubtful application, and supported only by the views of some one botanist.

The indulgence of professional botanists is asked for the style of the book, wherein it has been sought to simplify the language in order to adapt the book to the beginner and the student who needs to make field identifications. In this way the glossary is shorter than that in Gray's "Manual" by two-thirds, and the descriptions, and above all the keys, are based mostly on easily visible characters. For more detailed and technical descriptions the student is referred to more comprehensive books.

It should be noted that for the sake of brevity, characters brought out in the keys are not generally repeated in the descriptive text, and that characterizations of families and genera are often not applicable beyond the species represented in this flora.

The synonymy, for economy of space, is reduced to skeleton form, as in Gray's "Manual," and is intended only to link the varying nomenclature now in use in the United States, and to account for names used in early writings on the dune flora.

For the determinations of the specimens on which the species of grasses, sedges, and Bidens are based, the author, and not his collaborators who contributed the texts, assumes responsibility.

The limits of the floral region under treatment are, as usual, rather arbitrary, but as natural as the author could make them. On the west is the artificial boundary of the Illinois-Indiana state line, and on the northeast the Indiana-Michigan line. The northern boundary is the very natural one of the lake, the entire Lake Michigan coast of Indiana. On the south and southeast the boundary is an irregular one, following the high-water mark of old glacial Lake Chicago, where it washed the foot of the Valparaiso moraine. In this way are excluded from the flora the "rich soil" plants growing on the typical limestone of Indiana, now largely given up to agriculture. The region considered is, then, the ancient bed of glacial Lake Chicago, a region of dunes, lagoons, bogs, swamps, strands, lakes, slow rivers, and prairies. The geology of the region has been treated by Leavitt and Taylor, Blatchley, and Salisbury; the ecology of the flora has been classically reviewed by Cowles in two articles; the origin of the flora has been sketched by the present author in technical papers.

The author wishes to thank not only his collaborators who have contributed various families and genera, and those who have furnished notes and specimens, but those curators and librarians who have allowed him full liberty in the collections under their charge, his former teachers who have encouraged him, and Professor Elliott Downing, Dr. Anna Q. Churchill, Mr. J. Francis Macbride, and Dr. Edgar T. Wherry, and those who, in a variety of small ways not directly visible, have assisted him.

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PLANT HUNTING IN THE DUNES

In the heart of the Middle Western prairie country, on the threshold of one of the world's largest cities, lies a wild and fascinating treasure land of plant life. Varying with the varying geologic phases of the region, it stretches through the great chain of sand hills and the curving lagoons and marshes that follow the contour of Lake Michigan in Indiana.

Although fifty years have elapsed since the first botanists and amateurs explored this region, as yet no book exclusively devoted to its wild flowers has appeared. Every year increases the number of nature lovers, students, and professional naturalists who frequent the dunes, and the demand for a guide to the plant life of the region has been constantly more keenly felt. This little book is intended to fill that need. It is made brief and of small size so that it may be carried into the field in the pocket; it is made simple and as untechnical as science permits, that it may be useful to amateurs or to students working in the field without an elaborate equipment of microscopes and reference books to aid them. It is made as complete as the author knows how to make it, that it may satisfy the professional botanist's interest in the technical sides of the vegetation of the dunes, as well as the amateur's more esthetic interest.

Spring comes late in the dune country, and in the earlier months of the year little is to be noted except hepaticas, anemones, the first few violets, the water-cowslip, the lupine and a lovely phlox, beside the leafing and flowering of the early catkin-bearing trees. Presently buttercups, Jack-in-the-pulpit, blue flag and shad-bush flower; here and there dogwood, tulip tree, flowering crab apple and trailing arbutus are abundant.

With the coming of warm weather the strangely beautiful dune cactus bursts into bloom; wild roses are everywhere; the last trees take on full leafage, and step by step summer comes on, bringing in the flowering mints and the full tide and splendor of the water-lilies, of the handsome grasses and the true lily family, while bog and meadow and wood abound in orchids.

In autumn the meadows are filled with the great golden foxgloves and the little purple ones; more than a dozen kinds of sunflower fill the oak woods with gold; three species of stately purple blazing star are everywhere, and the bogs are one sheet of gold where *Bidens coronata* stretches away over watery acres. Now, too, the curious sedge family reaches its height, with over one hundred and fifty different species, the most striking being the graceful cottony heads of Eriophorum, and the brown tassels of wool-grass. The composite family, with one hundred and fifty species or more, reaches its height in autumn, the largest of all the families; most striking of all its members are the ironweeds, the asters with twenty or more different species, and the goldenrods, equally abundant. One by one the flowers fade, but as they go the splendor of the oaks and maples, the most abundant and beautiful trees of the dunes, bursts forth in such coloration as only the region of the Great Lakes produces.

Finally the last leaf has fallen, the endless miles of cat-tail marsh disperse their winged down, and only the little witch hazel shows forth its bleak and wintry blossoms in the woods. But the sport of plant hunting is not over. A series of articles distinguished both for science and literary charm was written by the late E. J. Hill on the joys of rambling the winter dunes for plants. Catbrier berries, buckthorn, bittersweet, bearberry, Evonymus, bayberry, and deciduous holly berries make the woods gay with their various colors and now, when all other trees seem dead, the miles and miles of great evergreen coniferous forests come into their kingdom.

So varied, so bewilderingly numerous are the hills, the marshes, the bogs, the prairies and the lakes of this region that one who first endeavors to study them is at a loss where to begin. It is therefore advisable to suggest a few localities where interesting or beautiful plants are to be found. The map gives the general features of the region and the boundaries of the natural vegetation of the dunes. A few words will describe the most famous happy hunting grounds.

In the first place the region under consideration falls into two well defined divisions, the "High Dune Country," a series of more or less active dunes extending along Lake Michigan's shore from Miller to the Michigan-Indiana state line, a very narrow curving strip, and the "Calumet District," a great sandy and marshy tract to the west, having as its limit the Indiana-Illinois state line.

In particular Long Lake and the lagoons around Miller and Dune Park are of interest for water plants; the dunes of Tremont are best for the plants growing in pure sand, while the woods beyond Michigan City contain a good many species liking somewhat richer soil, such as trilliums, baneberries, etc., that are less abundant in other parts of the region.

Turning now to the larger Calumet District, the visitor will find it devoid of the recreational attractions of the high dune country, as it is a low, often monotonous, marshy and sandy district, crisscrossed by railroads, canals and highways. However, for the students of plant life this region is, if possible, more interesting than the high dune country, for here occur a great number of plants which, as botanists say, are out of their normal range, that is, occurring generally on the Atlantic coast and "reappearing" in the Calumet District. The banks and waters of the Grand Calumet River, the lagoons at Pine and Clarke and the margins of Wolf Lake are especially rich in plants of this sort. Many western plants are found here, too; there is a strong prairie element in the flora of the southwestern corner of the range of this book, around Dyer. Throughout the Calumet District, around cities and along railroads, is found a flora which, while essentially weedy, is of interest because, waif-like, it has recently spread into our region from Europe, the West, the tropics and every quarter of the globe. Especially famous collecting grounds are found at Pine and Clarke, at Liverpool and East Gary, at Aetna and Dyer, and above all for rare water plants Wolf Lake is recommended.

With all these inviting prospects, there is plenty to tempt the nature lover to hunt the plants of the dunes. But the zeal for hunting should not allow one to do damage to the beautiful vegetation. Certain flowers are protected by law; no plants at all may be collected in the State Park without permission, and the private property rights at Mineral Springs and other places are rigidly maintained. Nor is it necessary to pick great bunches of flowers, sure soon to fade, in order to enjoy or study them. Some great biological discoveries have been made by scientists who seldom had to destroy any plant to make them.

In conclusion a mere sketch of the history of botanical study in the dunes may be appropriate. The scientific possibilities of the dunes were first realized by Dr. Henry Holmes Babcock about 1870, soon followed by Professor Blatchley, State Geologist, Dr. J. M. Coulter, Mason Bross, Dr. Wm. Moffatt, H. S. Pepoon, and E. J. Hill. With Mr. Hill's work was generally associated that of Mrs. Agnes Chase; C. E. Mell and L. M. Umbach were also collectors in the dune region. By 1910 most of these collectors, except Moffatt and Pepoon, were dead or had ceased active work in this region and were followed by others, such as Charles C. Deam, State Forester, Willard N. Clute, E. E. Sherff, F. C. Gates, O. E. Lansing, Jr., M. W. Lyon, Jr., J. A. Nieuwland, and the author of this volume. For many years the name of Dr. H. C. Cowles has been intimately associated with the dunes by reason of his work on plant ecology.

HOW TO USE A KEY

A botanical key is a device to enable a student to identify a plant with facility. Without it one would be obliged to compare an unknown plant with every described family. The key is like a motorist's Blue Book, showing him what turnings to take. It proceeds by a process of elimination. The plant to be identified will fit into one of two offered alternative categories. When it is so pigeonholed another alternative pair presents itself. In this way the plant is tracked down to a family. One then turns to the page indicated for the family, where keys to genera are provided. Through the genus the plant is tracked by keys to the proper species, where a fuller description is offered.

Exceptions and perplexities are frequent in the plant kingdom. Families, genera and species are merely collections of plants that resemble each other more than they differ. On the margins of every such semi-artificial group of plants are individuals or species or genera that only half conform to the definitions of the group, and tend to grade over into other groups. A too-literal-mindedness may no more be brought to a key than to a sketch map.

A little experience enables one to recognize most families on sight, if not by their obscurer technical characters, then by their "ear-marks." The big key to families may then be dispensed with, which will prove an advantage, as no family key has ever been devised that provides a royal road for the student.

If the student does not succeed in tracing his plant to its family immediately, he should not at once blame the key, nor assume that he has a plant not to be found in the book. Allowance must be made for exceptions, and above all for "snags"—that is, the deceptive resemblance of some organ to another. The author has tried to take these obstacles into account, but he welcomes any fresh suggestions.

In the identification of a plant good flowering material is necessary; scraps of leaves and of inflorescences are insufficient. By hunting about a little, one may usually pick up a fruiting specimen in the neighborhood of a flowering one of the same species. This is a great help in identification, and some families, like the sedges, crucifers, and umbellifers, may hardly be identified without fruit. A little lens is necessary.

ANALYTICAL KEY TO THE FAMILIES

Subkingdom I

FERNS AND FERN-ALLIES (Pteridophyta)

True flowers none; reproduction by spores; fern-like, moss-like, or rush-like plants (see further page 27).

Stems conspicuously jointed, their nodes covered by toothed sheaths; plants of rush-like habit.................... *Equisetaceae* 34.
Stems without conspicuous sheathed joints.
Leaves closely overlapping or very narrow; sporangia sessile, axillary in a cone; plants moss-like in habit.
Sporangia bearing minute uniform spores.............. *Lycopodiaceae* 35.
Sporangia of 2 kinds, some containing many minute spores, others 3 or 4 much larger spores......... *Selaginellaceae* 36.
Leaves (fronds) not closely overlapping; if narrow, without axillary sporangia; plants mostly fern-like (except some *Ophioglossaceae*, which have orchid-like leaves, and flower-like fruiting spikes).
Spore-bearing frond or portion of frond essentially like the sterile.................................. *Polypodiaceae* 27.
Spore-bearing and sterile fronds or parts of fronds markedly differentiated.
Sterile segment of the frond a simple broad leaf ..... *Ophioglossaceae* 33.
Sterile fronds or segments of fronds compound.
Rootstock practically none..................... *Ophioglossaceae* 33.
Rootstock well developed.
Sporangia densely crowded, not 2-ranked....... *Osmundaceae* 32.
Sporangia 2-ranked, distinct or connected in bead-like chains........................ *Polypodiaceae* 27.

Subkingdom II

SEED PLANTS (Spermatophyta)

Possessing true flowers and producing seeds containing an embryo plant (see further page 36).

Subdivision 1

CONIFERS (Gymnospermae)

Pine-like trees or shrubs (in our species) with needle-like or scale-like, mostly evergreen leaves and cone-like or sometimes berry-like fruits; ovule not in a closed ovary.

A single family in our area............................ *Pinaceae* 37.

Subdivision 2

TRUE FLOWERING PLANTS (Angiospermae)

Ovule borne in a closed ovary; cotyledons normally 1 or 2; plants of various habit, but mostly not pine-like, the leaves rarely true needles or scales, and the fruit rarely cone-like (resembling cones in *Alnus, Betula, Liriodendron,* q.v.).

Class 1. MONOCOTYLEDONS

Stems without central pith or annular layers, but having the woody fibres scattered throughout the tissues (seen when cross-sectioned as scattered dots); seeds having a single cotyledon or primary leaf; parts of the flower usually in threes or sixes, never in fives; leaves alternate or basal, rarely whorled or opposite, usually parallel-veined or palmately ribbed.

- Small, lens-shaped, ellipsoidal or flask-shaped, free-floating aquatics without true leaves.................... *Lemnaceae* 107.
- Plants with stems and well-defined leaves.
  - Submerged aquatic plants; leaves and stems wholly underwater or just floating at the surface, the flowers or fruit sometimes elevated above the surface.
    - Flowers without petals.
      - Flowers perfect; leaves alternate.................. *Potamogetonaceae* 43.
      - Flowers unisexual; leaves opposite or whorled........ *Naiadaceae* 46.
    - Flowers with petals.
      - Flowers yellow.................................. *Pontederiaceae* 102.
      - Flowers white.................................. *Elodeaceae* 42.
  - Terrestrial plants, or if aquatic not wholly submerged, some parts of the stem normally exserted at all times above water.
    - Flowers without petals or soft-textured petal-like organs, the perianth scale-like, bristle-like, or none.
      - Flowers inclosed or subtended by overlapping husk-like scales.
        - Stem hollow, round or flattened; leaf sheaths split; anthers attached by the middle; plants mostly grass-like............................ *Gramineae* 48.
        - Stem solid, triangular; leaf sheaths not split; anthers attached by the base; plants mostly sedge-like.................................. *Cyperaceae* 75.
      - Flowers not inclosed in husk-like scales, though sometimes in heads subtended by modified leaves, involucres or spathes.
        - Leaves petioled, the blades palmately ribbed and net-veined; often compound.............. *Araceae* 104.
        - Leaves linear or sword-shaped, parallel-veined and not petioled.
          - Flowers in dense, roundish heads.
            - Heads spheroidal, pubescent................. *Eriocaulaceae* 110.
            - Heads globose, glabrous.
              - Flowers perfect......................... *Juncaceae* 111.
              - Flowers of 1 sex only.................... *Sparganiaceae* 39.

Flowers not in dense roundish heads.
Flowers in long-cylindric spikes.
Tall plants with thick, densely flowered spikes.......................... *Typhaceae* 39.
Low plants with slender, rather loosely flowered spikes...................... *Triglochinaceae* 47.
Flowers 1-several in a loose cluster on branching cymes.......................... *Juncaceae* 111.
Petals or petal-like parts present in the flower.
Stamens 1 or 2; flowers very irregular.............. *Orchidaceae* 129.
Stamens 3 or more.
Stamens only 3.
Rush-like or sedge-like plants, with inconspicuous flowers.............................. *Juncaceae* 111.
Plants not rush-like or sedge-like; flowers more or less showy.
Anthers facing inward; leaves petioled........ *Pontederiaceae* 102.
Anthers facing outward; leaves not petioled.... *Iridaceae* 126.
Stamens six or more (rarely 4).
Half of the stamens imperfect and withered.
Flowers yellow; plants rush-like.............. *Xyridaceae* 110.
Flowers blue or purple; plants not rush-like.
Tall, succulent marsh or aquatic plants..... *Pontederiaceae* 102.
Low, often weedy, terrestrial plants....... *Commelinaceae* 108.
All stamens perfect.
Leaves palmately ribbed.
Climbing vines.
Stems prickly......................... *Smilax* 124.
Stems not prickly..................... *Dioscoreaceae* 125.
Low erect herbs.
Leaves whorled; plants terrestrial........ *Trillium* 123.
Leaves basal; plants semi- or wholly aquatic........................... *Alismaceae* 40.
Leaves parallel-veined.
Perianth borne at base of ovary.
Plants dry-wiry, rush-like, or sedge-like... *Juncaceae* 111.
Plants lily-like, not dry-wiry............ *Liliaceae* 115.
Ovary at least adnate to the perianth or borne beneath it.
Flowers papery-dry, whitish; stem tall.... *Haemodoraceae* 125.
Flowers not papery, yellow; stem low..... *Amaryllidaceae* 125.

Class 2. **DICOTYLEDONS**

Stem composed of bark, wood, and pith, the wood forming in a zone between the other two and increasing when the stem is perennial by the addition of annual layers next to the bark; leaves mostly feather-veined, or net-veined; seeds having two cotyledons or primary leaves; parts of the flower usually in fives or fours.

Petals or corolla none; calyx or sepals (these sometimes petal-like) present or absent.

- Flowers with sexes generally in separate flowers and one or both sorts in catkins.
  - Leaves compound.
    - Trees.......... *Juglandaceae* 147.
    - Herbs.......... *Cannabinaceae* 156.
  - Leaves essentially simple, though sometimes lobed.
    - Herbs.
      - Leaves not deeply lobed.
        - Flowers in a small head surrounded by calyx-like involucre.......... *Iva* 382.
        - Flowers not as above.......... *Urticaceae* 157.
      - Leaves deeply palmately lobed.......... *Cannabinaceae* 156.
    - Trees or shrubs.
      - Leaves resinous-dotted, aromatic.......... *Myricaceae* 138.
      - Leaves not resinous-dotted, mostly not aromatic.
        - Flowers without a calyx, but scales present.......... *Salicaceae* 139.
        - Flowers with a calyx.
          - Fruit a nut or acorn; ovary 2-3-celled.
            - Only female flowers in catkins; fruit wholly or partly inclosed in a woody involucre (shell or cup).......... *Fagaceae* 152.
            - Both sexes in catkins; fruit not inclosed by a woody involucre though sometimes by a leaf-like one.......... *Betulaceae* 148.
          - Fruit not a nut or acorn; ovary 1-celled.
            - Juice milky; fruit compound, achenes imbedded in fleshy tissue.......... *Artocarpaceae* 156.
            - Juice not milky; fruit a simple drupe or samara.......... *Ulmaceae* 155.
- Flowers not, or only rarely in catkins, the sexes in the same flowers, or if separate, neither sex in catkins (flowers in catkin-like spikes but perfect in *Saururaceae*).
  - Trees, shrubs, or vines.
    - Leaves punctate with translucent dots.......... *Rutaceae* 245.
    - Leaves not dotted translucently.
      - Leaves silvery-scaly.......... *Elaeagnaceae* 272.
      - Leaves not silvery-scaly.
        - Leaves simple, or digitate only in vines, *Vitaceae*.
          - Vines.......... *Vitaceae* 259.
          - Trees or shrubs.
            - Calyx none.......... *Platanaceae* 138.
            - Calyx present.
              - Leaves alternate.
                - Calyx adherent to the ovary.......... *Cornaceae* 288.
                - Calyx free from the ovary.......... *Lauraceae* 190.
              - Leaves opposite.
                - Leaves palmately lobed.......... *Aceraceae* 256.
                - Leaves not lobed.......... *Rhamnaceae* 257.
        - Leaves compound.
          - Fruit with 2 wings.......... *Aceraceae* 256.
          - Fruit with 1 wing.......... *Oleaceae* 301.
  - Herbs.
    - Stipules sheathing the stem at the nodes.......... *Polygonaceae* 163.

        - Stipules none, or if present, not sheathing the nodes.
          - Aquatics, submerged or nearly so.
            - Flowers bursting from a spathe.................. *Podostemaceae* 208.
            - Flowers not bursting from a spathe.
              - Leaves dissected.
                - Calyx adnate to the ovary.................. *Myriophyllaceae* 278.
                - Calyx free from the ovary.................. *Ceratophyllaceae* 178.
              - Leaves entire.............................. *Callitrichaceae* 251.
          - Terrestrial, marsh, or aquatic plants, but not submerged.
            - Calyx adhering to the ovary or surmounting it.
              - Leaves alternate or all basal.
                - Stamens 4................................ *Epilobiaceae* 273.
                - Stamens more than 4.
                  - Stamens 5.............................. *Santalaceae* 255.
                  - Stamens 6-12.
                    - Leaves all basal....................... *Aristolochiaceae* 191.
                    - Stems leafy.......................... *Chrysosplenium* 209.
              - Leaves opposite............................ *Nyctaginaceae* 172.
            - Calyx, if present, free from the ovary or inserted beneath it.
              - Leaves opposite.
                - Ovary 3-lobed, stalked..................... *Euphorbiaceae* 249.
                - Ovary not 3-lobed.
                  - Ovaries 2 or more....................... *Molluginaceae* 173.
                  - Ovary 1.
                    - Calyx very woolly..................... *Amaranthaceae* 159.
                    - Calyx not woolly.
                      - Flowers surrounded by calyx-like involucre....................... *Iva* 382.
                      - Flowers not surrounded by calyx-like involucre..................... *Silenaceae* 174.
              - Leaves alternate.
                - Ovary 3-lobed, stalked..................... *Euphorbiaceae* 249.
                - Ovary not lobed.
                  - Flowers overlapped with dry, papery, persistent bracts.................... *Amaranthaceae* 159.
                  - Flowers not as above.
                    - Stamens of 2 lengths.................. *Lepidium* 198.
                    - Stamens all the same length.
                      - Ovaries several, often joined at base.
                        - Calyx none....................... *Saururaceae* 138.
                        - Calyx present.
                          - Leaves sessile................... *Penthorum* 207.
                          - At least some of the leaves petioled. *Ranunculaceae* 181.
                      - Ovary 1.
                        - Styles 10........................ *Phytolaccaceae* 172.
                        - Styles or stigmas 2-5............... *Chenopodiaceae* 160.
- Petals present, generally in addition to sepals, but the sepals sometimes early deciduous.
  - Petals separate.
    - Stamens numerous, at least more than 10 (rarely 9-10 in the *Capparidaceae*) and more than twice as many as the sepals or calyx-lobes.

- Calyx entirely free and separate from the pistil or pistils.
  - Pistils several or many, wholly distinct or united at base into a several-beaked, lobed ovary.
    - Aquatics with peltate leaves.................. *Nymphaeaceae* 179.
    - Terrestrials or if rarely aquatic then the leaves dissected.
      - Filaments of the stamens united into a tube... *Malvaceae* 261.
      - Filaments of the stamens not united.
        - Stamens inserted on the calyx............. *Rosaceae* 212.
        - Stamens on the receptacle or disk.
          - Herbs................................ *Ranunculaceae* 181.
          - Trees or shrubs.
            - Sepals and petals overlapping.......... *Magnoliaceae* 188.
            - Sepals and petals not overlapping ..... *Annonaceae* 189.
  - Pistils strictly 1 as to ovary; the styles or stigmas may be several.
    - Leaves punctate with translucent dots.......... *Hypericaceae* 262.
    - Leaves not punctate.
      - Leaves tubular or trumpet-shaped............ *Sarraceniaceae* 205.
      - Leaves not tubular or trumpet-shaped.
        - Leaves peltate.
          - Aquatic plants .... *Nymphaeaceae* 179.
          - Terrestrial plants..................... *Podophyllaceae* 191.
        - Leaves not peltate.
          - Juice bright red or yellow............... *Papaveraceae* 192.
          - Juice not red or yellow.
            - Plants with clammy or sticky hairs..... *Capparidaceae* 205.
            - Hairs if present not clammy or sticky.
              - Flowers on a peduncle adherent to a leaf-like bract; trees.......... *Tiliaceae* 261.
              - Flower peduncles not adherent to a bract.
                - Stamens united in a tube......... *Malvaceae* 261.
                - Stamens not united in a tube.
                  - Stamens inserted on the calyx... *Rosaceae* 212.
                  - Stamens not on the calyx.
                    - Sepals 2.................... *Portulacaceae* 173.
                    - Sepals 3 or more.
                      - Leaves entire, simple....... *Cistaceae* 265.
                      - Leaves variously toothed, cleft, or compound... *Ranunculaceae* 181.
- Calyx more or less adherent to a compound ovary.
  - Aquatics with peltate leaves.................... *Nymphaeaceae* 179.
  - Terrestrial plants; leaves not peltate.
    - Fleshy plants without true foliage; spiny........ *Cactaceae* 272.
    - Leaves present.
      - Low, nearly stemless plants with heart-shaped leathery leaves and small, fleshy, jug-shaped flowers...................... *Aristolochiaceae* 191.
      - Flowers not jug-shaped or markedly fleshy; leaves not fleshy, or if somewhat fleshy, then not heart-shaped.
        - Sepals 2............................. *Portulacaceae* 173.

Sepals more than 2.
Stipules none.
Trees; leaves alternate .... *Juglandaceae* 147.
Herbs; leaves chiefly opposite .... *Saxifragaceae* 208.
Stipules present....................... *Rosaceae* 212.
Stamens not more than twice as many as the petals.
Stamens of the same number as the petals and opposite them.
Trees, shrubs, or vines.
Calyx lobes minute or obsolete..... .... *Vitaceae* 259.
Calyx 4-5-cleft.............................. *Rhamnaceae* 257.
Herbs.
Style 1, unbranched.
Petals thick, shorter than sepals, greenish..... *Podophyllaceae* 191.
Petals thin, yellow, as long as the sepals or longer............................ *Primulaceae* 299.
Styles and stigmas more than 1................ *Portulacaceae* 173.
Stamens not of the same number as the petals, or if of the same number, then alternate with them.
Calyx free from the ovary.
Ovaries 2 or more, wholly separate or partly united.
Stamens united with each other and with a large thick stigma common to the 2 ovaries........................... *Asclepiadaceae* 307.
Stamens free from each other and from the pistils.
Stamens inserted on the calyx.
Plant fleshy; stamens just twice as many as the pistils.................... *Crassulaceae* 207.
Plant not fleshy; stamens not twice as many as the pistils.
Stipules present..................... *Rosaceae* 212.
Stipules none....................... *Saxifragaceae* 208.
Stamens inserted on the receptacle.
Trees or shrubs; leaves translucent-dotted. *Rutaceae* 245.
Herbs; leaves not translucent-dotted.
Leaves fleshy....................... *Crassulaceae* 207.
Leaves not fleshy.
Ovaries or lobes of the ovary 2-5, with a common style.
Aquatic plants.................. *Limnanthaceae* 246.
Terrestrial plants................ *Geraniaceae* 244.
Ovaries with separate styles or sessile stigmas.................... *Ranunculaceae* 181.
Ovary 1.
Flowers irregular or spurred.
Stamens coherent by their filaments, 2 or more in a group.
Calyx 5-cleft......................... *Leguminosae* 230.
Sepals apparently 4................... *Polygalaceae* 247.
Stamens essentially free from each other, though the anthers sometimes touch but are not connected.
Leaves compound.

Corolla spurred...................... *Corydalaceae* 193.
Corolla not spurred.................. *Leguminosae* 230.
Leaves simple.
Sepals 5 .... *Violaceae* 267.
Sepals apparently only 4............. *Impatientaceae* 248.
Flowers regular.
Stamens neither just as many nor twice as many as the petals.
Plant with sticky or clammy hairs....... *Capparidaceae* 205.
Hairs, if present, not sticky or clammy.
Leaves punctate with translucent dots. *Hypericaceae* 262.
Leaves not translucent-dotted.
Trees........................... *Aceraceae* 256.
Herbs.
Calyx of 3 equal or 5 very unequal sepals.................... *Cistaceae* 265.
Calyx of 4 equal sepals........... *Cruciferae* 194.
Stamens just as many or twice as many as the petals.
Trees or shrubs.
Leaves punctate with translucent dots.
Leaves compound.................. *Rutacceae* 245.
Leaves simple..................... *Ilicaceae* 254.
Leaves not translucent-dotted.
Leaves compound.................. *Anacardiaceae* 252.
Leaves abruptly pinnate (with an even number of leaflets).... *Leguminosae* 230.
Leaves with an odd number of leaflets, that is, having a terminal one................ *Anacardiaceae* 252.
Leaves simple.
Leaves opposite.
Leaves palmately veined........ *Aceraceae* 256.
Leaves pinnately veined........ *Celastraceae* 254.
Leaves alternate.
Climbing or trailing vine....... *Celastraceae* 254.
Erect shrubs.
Stamens on the receptacle or disk.................. *Ilicaceae* 254.
Stamens inserted on the calyx. *Ericaceae* 293.
Herbs, sometimes a little spongy-woody at base.
Leaves trifoliate..................... *Oxalidaceae* 244.
Leaves simple or variously compound, not trifoliate.
Leaves beset with hairs bearing glistening drops of a clear sticky fluid....................... *Droseraceae* 206.
Leaves without liquid-bearing hairs.
Ovary 3-lobed, on a stalk......... *Euphorbiaceae* 249.
Ovary not 3-lobed.
Pallid or reddish saprophytic plants.................. *Monotropaceae* 292.
Plants green, not saprophytic.

- Ovules and seeds, only 1 or 2 in in each cell.
  - Leaves simple............. *Linaceae* 243.
  - Leaves compound, more or less deeply cleft, or parted.
    - Flowers white, rosy or purple............ *Geraniaceae* 244.
    - Flowers yellow.......... *Cassia* 232.
- Ovules and seeds numerous in each cell.
  - Foliage evergreen.......... *Pyrolaceae* 290.
  - Foliage not evergreen.
    - Leaves compound........ *Leguminosae* 230.
    - Leaves simple.
      - Style 1.
        - Branches or stems round........ *Saxifragaceae* 208.
        - Branches square..... *Lythraceae* 270.
      - Styles 2-5.
        - Minute marsh plants.. *Elatinaceae* 265.
        - Terrestrials, not minute. *Silenaceae* 174.

- Calyx tube adherent to the ovary, at least to the lower part.
  - Tendril-bearing and often succulent herbs....... *Cucurbitaceae* 356.
  - Not tendril-bearing.
    - Trees or shrubs or vines.
      - Leaves palmately lobed.
        - Tall, mostly single-stemmed, strongly woody shrubs or trees............ *Rosaceae* 212.
        - Low, many-stemmed, soft-woody bushes.. *Ribesiaceae* 210.
      - Leaves not lobed.
        - Flowers autumnal; petals long and narrow. *Hamamelidaceae* 211.
        - Flowers in spring or summer; petals short or roundish.
          - Branchlets square or if roundish, then a climbing vine.................. *Celastraceae* 254.
          - Branchlets roundish; erect trees or shrubs.
            - Thorny.......................... *Rosaceae* 212.
            - Not thorny...................... *Cornaceae* 288.
    - Herbs.
      - Sepals 2.
        - Style single.......................... *Circaea* 278.
        - Styles 2-8............................ *Portulacaceae* 173.
      - Sepals more numerous.
        - Leaves 3-7-ribbed, simple............... *Melastomacae* 272.
        - Leaves with 1 principal nerve, or if with more, then compound.
          - Stamens 5 or 10.
            - Inflorescence an umbel.
              - Fruit a drupe; styles 2 or mostly 5.. *Araliaceae* 280.
              - Fruit dry, splitting at maturity; styles 2.................. *Umbelliferae* 281.

Inflorescence not an umbel or compound cyme, generally a raceme or panicle, or a simple cyme, or rarely the flowers solitary..... *Saxifragaceae* 208.
Stamens 2, 4, or 8.
Styles or sessile stigmas 4........... *Myriophyllaceae* 278.
Style 1.
The cluster of small flowers inclosed in 4 petal-like bract leaves.. *Cornaceae* 288.
Flowers not surrounded by petal-like bracts................ *Epilobiaceae* 273.
Petals more or less united into a lobed corolla.
Flowers united into a dense composite head, closely surrounded by calyx-like bracts, often with some of the marginal flowers with 1 corolla-lobe much enlarged and looking like a petal............... *Compositae* 360.
Flowers not united into genuinely compound heads with bracts, though loose clusters sometimes accompanied by leaf-like bracts.
Stamens more numerous than the lobes of the corolla.
Stamens free from the corolla.
Flowers irregular.
Corolla spurred.......................... *Corydalaceae* 193.
Corolla not spurred...................... *Leguminosae* 230.
Flowers regular.
Leaves 3-foliate.......................... *Oxalidaceae* 244.
Leaves not 3-foliate...................... *Ericaceae* 293.
Stamens adhering to the corolla, at least below.
Stamens not united....................... *Ericaceae* 293.
Stamens united into a tube.
Flowers irregular........................ *Polygalaceae* 247.
Flowers regular.......................... *Malvaceae* 261.
Stamens not more numerous than the corolla lobes.
Stamens of the same number as the corolla lobes and opposite them........................ *Primulaceae* 299.
Stamens alternate with the corolla lobes, or fewer.
Ovary free from the calyx tube.
Corolla regular.
Stamens as many as the corolla lobes.
Ovaries more than 1, or if 1, deeply lobed.
Ovaries 2, or if only 1, 2-horned.
Stamens united.................. *Asclepiadaceae* 307.
Stamens not united.............. *Apocynaceae* 306.
Ovary 1, but deeply 4-lobed.
Leaves alternate................. *Boraginaceae* 314.
Leaves opposite.................. *Labiatae* 320.
Ovary 1, not deeply lobed.
Corolla papery and dry............. *Plantaginaceae* 346.
Corolla not dry-papery.
Leafless yellowish twining parasites. *Cuscuta* 311.
Plants green.
Trees or shrubs.
Style 1.................... *Ericaceae* 293.
Style none; stigma sessile..... *Ilicaceae* 254.

Herbs.
Leaves opposite.
Stamens 4, in 2 pairs of unequal length......... *Verbenaceae* 317.
Stamens 5 or rarely 4, but all of equal length.
Ovary 1-celled........... *Gentianaceae* 302.
Ovary 3-celled........... *Polemoniaceae* 312.
Leaves alternate.
Leaves trifoliate........... *Menyanthes* 306.
Leaves not trifoliate.
Leaves deeply cut-toothed, lobed, or pinnate... *Hydrophyllaceae* 313.
Leaves simple, if toothed, not deeply so.
Seeds and ovules few, mostly 4........ *Convolvulaceae* 309.
Seeds many........... *Solanaceae* 330.
Stamens fewer than the corolla lobes.
Stamens with anthers 4, in pairs....... *Verbenaceae* 317.
Ovary 4-lobed.................... *Labiatae* 320.
Ovary not 4-lobed.
Fruit splitting into 2 or 4 nutlets... *Verbenaceae* 317.
Fruit a capsule, *Petunia* in........ *Solanaceae* 330.
Stamens with anthers only 2 or 3.
Ovary 4-lobed.................... *Lycopus* 328.
Ovary not 4-lobed.
Corolla dry-papery............... *Plantaginaceae* 346.
Corolla not dry-papery.
Herbs....................... *Veronica* 341.
Shrubs...................... *Oleaceae* 301.
Corolla irregular.
Stamens with anthers 5................. *Verbascum* 334.
Stamens with anthers 2 or 4.
Parasitic plants without green foliage... *Orobanchaceae* 345.
Plants with green foliage.
Ovary 4-lobed, style rising between the lobes.................. *Labiatae* 320.
Ovary not 4-lobed.
Ovules solitary in the 2-4 cells; generally terrestrial or mud plants. *Verbenaceae* 317.
Ovules 2-many in each cell.
Stamens 2; aquatic or mud plants, with finely dissected leaves or practically no leaves.... *Pinguiculaceae* 344.
Stamens 4 or sometimes 2; generally terrestrial plants or if aquatic plants the leaves not finely dissected...... *Scrophulariaceae* 333.
Ovary adherent to the calyx tube.
Tendril-bearing herbs with the anthers often united............................. *Cucurbitaceae* 356.
Tendrils none.
Stamens separate.

- Stamens free from the corolla or nearly so; stipules none; juice slightly milky.. *Campanulaceae* 358.
- Stamens inserted on the corolla.
  - Leaves opposite or perfoliate but neither whorled nor provided with stipules........................ *Loniceraceae* 351.
  - Leaves either opposite and provided with stipules or, if destitute of stipules, then the leaves whorled......... *Rubiaceae* 347.
- Stamens united by their anthers into a tube. *Lobeliaceae* 359.

SYSTEMATIC LIST OF THE FAMILIES, GENERA, AND SPECIES

Subkingdom I

FERNS AND FERN-ALLIES (Pteridophyta)

Plants distinguished from the Spermatophytes in having no flowers or seeds, and from the other Cryptogams in being differentiated into stems and leaves (fronds), some of which bear asexual reproductive bodies (spores); sexual stage a small thallus or flat green body found in damp places and rarely observed. Unlike other Cryptogams, and like the *Spermatophyta*, the asexual stage has vascular tissue.

POLYPODY FAMILY (Polypodiaceae)

Herbaceous leafy plants with chiefly creeping rhizomes; spores in spore cases, clustered in lines or fruit dots on the margins or backs of fronds; fruit dots often covered, especially when young, by a membrane or indusium.

- Spore-bearing fronds markedly contracted, the segments berry-like; sterile fronds broadly leafy.................. *Onoclea* 11.
- Spore-bearing fronds essentially similar to the sterile ones.
  - Sporangia borne at the edge of the lobes or segments, as a continuous marginal line.
    - Rootstocks widely creeping, slender, naked or hairy, devoid of scales; tall, coarse ferns............. *Pteridium* 4.
    - Rootstocks erect or short-creeping, with a copious covering of overlapping scales; low delicate fern....... *Adiantum* 3.
  - Sporangia borne on the back of the segments, in definite clusters (sori) not on the margins.
    - Margins of pinnae with many slender bristly teeth; sori confined to the contracted uppermost pinnae of some of the blades, large, continuous.......... *Polystichum* 8.
    - Margins of pinnae not bristle-toothed; sori not confined to the tip of the blade.
      - Veins partially meeting, forming a series of narrow meshes along the midveins of the pinnae and segments.............................. *Woodwardia* 5.
      - Veins free, not crisscrossing to form meshes.
        - Sori linear to oblong.
          - Leaves evergreen; sori straight or nearly so; low ferns mostly not over 3 dm. tall......... *Asplenium* 6.
          - Leaves not evergreen; sori curved; taller ferns mostly over 5 dm. tall................. *Athyrium* 7.

Sori roundish.
  Blades lobed almost to the middle, the segments entire or nearly so.................... *Polypodium* 1.
  Blades 1-3-pinnate, the primary pinnae sessile or stalked.
    Indusium none, or soon withering, when present attached at the side.
      Fronds in our species triangular in outline... *Phegopteris* 2.
      Fronds in our species oblong-lanceolate in outline.......................... *Filix* 10.
    Indusium peltate (fixed beneath by its center), persistent.......................... *Thelypteris* 9.

1. POLYPODIUM L. Polypody

Rootstock creeping; branches often chaffy-scaly; stipes jointed on the rootstock; fruit dots round, arranged in 1 or more rows on each side of the midrib, each borne on the end of a free veinlet.

1. **P. virginianum** L. Rhizome soft and spongy, with dark scales; stipes 0.1-2 dm. long, slender; fronds 0.25-2.6 dm. long, generally about 1 cm. broad; pinnae alternate or the lower subopposite; sori nearly marginal. (*P. vulgare* of auths., not L.)—A handsome little fern, variable as to leaf shape, found in rich soil, on rocks, and, rarely, on tree trunks. Rare and local, as in woods at Mineral Springs, at Tamarack Sta., acc. to Nieuwland, and formerly reported from Pine. Summer.

2. PHEGOPTERIS Fée. Beech Fern

Stipes continuous with the rootstock, not jointed; fruit dots small, on the backs of the veins near the apex; fronds light green, decaying in early autumn.

1. **P. hexagonoptera** (Michx.) Fée. Fronds twice pinnatifid, triangular, broader than long, 15-30 cm. broad, slightly pubescent; pinnae all sessile, adnate to the wing of the rachis, the lowest large, often pinnately lobed; fruit dots near the margin. (*Thelypteris* Slosson; *Dryopteris* Christ.)—Low woods behind the high dunes, locally abundant. Summer.

3. ADIANTUM L. Maiden-hair

Stipes dark and shining, slender; delicate branching pinnate fronds with numerous pinnules.

1. **A. pedatum** L. 2-5 dm. tall, forking at the summit of the rhachises, gracefully recurved; pinnules short-stalked, obliquely triangular, delicately veiny.—Infrequent, in rich cool woods and black loam, Dune Park to Michigan City and eastward.

4. PTERIDIUM Scop. Bracken. Brake

Fronds ternately decompound, rather coarse as to stipes and texture; fruit dots in continuous confluent lines.

1. **P. latiusculum** (Desv.) Maxon. Fronds 0.3-1 m. tall, dull light green, 3-forked at the summit of the stout stipe, the wide-spreading branches 2-pinnate, the lower pinnules pinnatifid. (*Pteris aquilina* of auths., not L.; *Pteris latiuscula* Desv.)—The commonest fern of oak woods, dune meadows and open sandy clay soil.

Var. **pseudocaudatum** (Clute) Maxon. With entire, elongated terminal pinnules; sometimes found with the species in our area, acc. to Clute.

5. WOODWARDIA Sm. Chain Fern

Large ferns with pinnatifid fronds and more or less reticulated veins, forming meshes; fruit dots in chain-like rows.

1. **W. virginica** (L.) Sm. Rootstocks 2-3 m. long, creeping; fronds tall (6-14 dm.); pinnae pinnatifid, numerous, with oblong segments; veins forming a single row of areoles; fruit dots one to an areole, at length continuous and confluent. (*Anchistea* Presl.)—On bogs and in swamps, especially around *Chamaedaphne* bogs; when heavily fruiting in summer it sends up clouds of spores if shaken.

6. ASPLENIUM L. Spleenwort

Delicate little evergreen ferns with narrow fronds and numerous pinnae finely serrate or incised; scales of the rhizome and stipe narrow, firm; indusium straight or slightly curved, attached to the upper side of the vein.

1. **A. platyneuron** (L.) Oakes. (*Ebony Fern.*) Fronds rather rigidly erect, 1-2.5 dm. tall, narrow in outline, the fertile ones much taller; pinnae 1-3 cm. long, dark green, alternate, sessile, auricled; sori many, near the midnerve. (*A. ebeneum* Ait.)—Abundant along Dune Creek; rare at Dune Park and Miller in low rich woods.

7. ATHYRIUM Roth. Lady Fern

Scales of the rootstock thin; stipes green, not filiform; indusium generally curved, crossing the veins; rather large but delicate ferns.

Fronds bipinnatifid; indusium straight or slightly curved.....	*A. thelypteroides* 1.
Fronds bipinnate; indusium curved........................	*A. angustum* 2.

1. **A. thelypteroides** (Michx.) Desv. Fronds 6-12 dm. tall; pinnae deeply pinnatifid but not bipinnate, linear-lanceolate, the lobes small, some of them double. (*Asplenium* Michx.; *Asplenium acrostichoides* Sw.; *Diplazium acrostichoides* Butters; *Athyrium acrostichoides* Diels.)—A rare fragile fern of rich damp woods, Pine and Clarke acc. to Pepoon.

2. **A. angustum** (Willd.) Presl. Rootstocks concealed by the fleshy bases of old fronds; fronds bipinnate, 4-10 dm. tall, ovate-oblong or broadly lanceolate, widest near the middle, with numerous lanceolate pinnae, the pinnules merging on the secondary rachis; fruit dots

short, at length merging, curved, with toothed indusia and smooth, yellow or brown spores. (*Asplenium Filix-femina* of auths., in part, not L.)—Occasional in rich low woods, Dune Creek, Trail Creek, and on the tamarack bogs at Mineral Springs and Dune Park.

8. POLYSTICHUM Roth. Christmas Fern

Rootstocks stout; fronds leathery, evergreen; stipes and rachis chaffy.

1. **P. acrostichoides** (Michx.) Schott. 2-5 dm. tall; stipe scaly; fronds narrowly oblong, simply pinnate or the pinnae pinnatifid, the upper pinnae bearing spores, contracted; fruit dots merging in age. (*Aspidium* Sw.; *Dryopteris* Kuntze.)—A handsome species, conspicuous in winter, and abundant in low shady woods; occasional in the dry oak woods or under pines.

Forma **incisum** (Gray) House. Pinnae deeply incised. (Var. *Schweinitzii* Small.)—Rare in pine woods, Michigan City and perhaps elsewhere with the species.

9. THELYPTERIS Schmidel. Shield Fern

Mostly tufted rather delicate ferns with 1-3-pinnate fronds. The indusium is kidney-shaped or if roundish exhibiting a sinus at one side, though centrally attached. Stipes not articulated at base.

Rootstock slender, creeping extensively, practically scaleless; fronds dying down in winter; veins simple or once-forked.
- Lower pinnae gradually decreasing in size to the minute lowest one.................................... *T. noveboracensis* 3.
- Lower pinnae almost as large as those above.
  - Spore-bearing veins simple.......................... *T. simulata* 2.
  - Spore-bearing veins once forked..................... *T. palustris* 1.

Rootstock stout, erect or short-creeping, very scaly; fronds chiefly evergreen and firm; veins mostly twice or more forked.
- Blades leathery; sori nearer to the margins than the midribs of the segments.............................. *T. marginalis* 4.
- Blades firm but not leathery; sori half way between margin and midrib.
  - Spore-bearing leaves rigidly erect, slender, tall, long-stalked, narrowly-lanceolate to linear-oblong; sterile leaves spreading, short....................... *T. cristata* 5.
  - Spore-bearing leaves ascending or spreading as are the sterile, the blades oblong or ovate.
    - Pinnae oblique to the rachis, the basal distant, broadly triangular, the lobes with spiny curved teeth; indusia with no glands..................... *T. spinulosa* 6.
    - Pinnae at right angles to the rachis, the basal unequal-sided, ovate; pinnules pinnately divided with segments having spreading teeth; indusia glandular.................................. *T. intermedia* 7.

1. **T. palustris** (L.) Schott. Low, the fronds pinnate, in outline lanceolate; pinnae deeply pinnatifid, horizontal or slightly recurved,

with oblong lobes; margins strongly revolute, making the pinnules appear acute at the tip; fruit dots numerous, soon merging. (*T. Thelypteris* House; *Aspidium Thelypteris* Sw.; *Dryopteris Thelypteris* Gray.)—A pale green, fragrant fern, abundant on marshes, in swales, dune meadows, and moist prairies. August.

2. **T. simulata** (Davenport) Nieuwland. Resembling the preceding in habit; fruit dots only 3-10 on each lobe; indusia glandular-ciliolate. (*Aspidium simulatum* and *Dryopteris simulata* Davenport.)—Reported from boggy woods, Tolleston, by Pepoon (Umbach's collection). The report can not be accepted without reservation.

3. **T. noveboracensis** (L.) Nieuwland. Fronds lanceolate in outline, tapering at both ends and narrowest in the middle; pinnae lanceolate, the lowest pairs generally deflexed; fruit dots distinct near the margin; margins of the minute indusia bearing glands. (*Aspidium* Sw.; *Dryopteris* Gray.)—Locally abundant, dune meadows, low woods back of the high dunes, and in rich prairie thickets.

4. **T. marginalis** (L.) Nieuwland. Fronds smooth and thick, in outline ovate-oblong; pinnae lanceolate, acuminate, the pinnules oblong-scythe-shaped, crowded. (*Nephrodium* Michx.; *Dryopteris* Gray; *Aspidium* Sw.)—A large handsome fern, rare and local in damp woods, Miller and Dune Park, and a little more common east of Michigan City.

5. **T. cristata** (L.) Nieuwland. Fronds in outline lanceolate or linear-oblong; pinnae triangular-oblong, the lowest often triangular-ovate from a heart-shaped base and deeply pinnatifid; 6-10 pairs of divisions obtuse, serrate, oblong, the lowest pinnatifid-lobed; indusium round-kidney-shaped. (*Nephrodium* Michx.; *Dryopteris* Gray; *Aspidium* Sw.)—Low woods and marshes back of the high dunes from Dune Park eastward.

6. **T. spinulosa** (Muell.) Nieuwland. Scales of the stipe pale brown, deciduous; frond in outline ovate-lanceolate, twice pinnate; pinnae elongated-triangular, the lowest broadly triangular; pinnules connected by a narrow wing, oblong, serrate or pinnatifid with spinulose-toothed lobes; indusium without marginal glands. (*Nephrodium* Stempel; *Dryopteris* Kuntze; *Aspidium* Sw.)—Rich woods, Pine, and tamarack swamps, Dune Park to Tremont.

7. **T. intermedia** (Muhl.) House. Scales of the stipe with darker brown center; frond in outline broadly oblong-ovate, 3-pinnatifid; pinnae oblong-lanceolate, spreading, the lower triangular-ovate; pinnules crowded, spreading, pinnately cleft, ovate-oblong; margins of the indusia with stalked glands. (*Dryopteris* Gray; *D. spinulosa* var. Underw.; *Aspidium spinulosum* var. D. C. Eaton; *T. spinulosa* var. Weatherby.)—Swamps, low thickets, and tamarack bogs, Miller to Tremont.

10. FILIX Adans. Bladder Fern

Delicate 2-3-pinnate ferns with cut-toothed lobes and fruit dots borne on the back of straight forks of the free veins; indusia arched, attached by a broad base on the inner side, partly under the dot, and early thrown back and withering.

1. **F. fragilis** (L.) Gilbert. Stipe brittle; frond 1-3 dm. long; pinnae and pinnules lanceolate or ovate, irregularly pinnatifid, decurrent on the winged rachis; indusium acute at the free end. (*Cystopteris* Bernh.)—In low woods back of the high dunes, Tremont.

11. ONOCLEA L. Sensitive Fern

Rootstocks creeping, forming new plants; sterile fronds leaf-like, once pinnatifid; fertile fronds bipinnate, erect, rigid, with berry-like divisions which finally burst, allowing escape of spores. The fertile fronds differ from those of the following family, *Osmundaceae,* in being 2-ranked and rigid.

1. **O. sensibilis** L. Sterile fronds long-stalked, pale green, the blades 1-5 dm. long; segments oblong-lanceolate; veins crisscrossed with fine meshes.—Common in moist meadows and on prairies and in low rich woods, throughout. September.

CINNAMON FERN FAMILY (Osmundaceae)

Leafy ferns with creeping rhizomes; stipes winged at base; spore-bearing fronds or segments contracted, the fruit dots arranged in dense, head-like rows.

1. OSMUNDA L. Flowering Ferns

Tall upright ferns springing up in clumps from thick rootstocks; fronds 1-2-pinnate, the spore-bearing fronds or portions of fronds at length without green color and much contracted.

Some of the sterile fronds interrupted in the middle by a contracted, spore-bearing portion .... *O. Claytoniana* 2.
None of the sterile fronds contracted in the middle.
  Spore-bearing pinnae racemose-panicled at the summit of the sterile frond .... *O. regalis* 1.
  Spore-bearing frond wholly separate from the sterile frond.. *O. cinnamomea* 3.

1. **O. regalis** L. var. **spectabilis** (Willd.) Gray. (*Royal Fern.*) Smooth, pale green, the sterile fronds truly bipinnate with 13-25 rather distant pinnules.—A tall and graceful fern common on swales, moist prairies, dune meadows and in low woods. May, June.

2. **O. Claytoniana** L. (*Interrupted Fern.*) Rusty-woolly in youth; sterile fronds pinnate; pinnae pinnatifid, oblong-lanceolate, with obtuse divisions. (*O. interrupta* Michx.)—Fruiting as it unfolds. The contracted fertile portion which "interrupts" the leafy sterile fronds is unique. In damp ground and borders of Nyssa woods at Dune Park, Mineral Springs, etc. May.

3. **O. cinnamomea** L. (*Cinnamon Fern.*) Rusty-woolly when young, the lanceolate pinnae of the tall sterile frond pinnate and again pinnatifid into broad, obtuse, crowded divisions; spore-bearing fronds appearing earlier, bearing cinnamon-colored fruit dots.—A handsome fern, common in rich woods, in swamps and on bogs and river banks, throughout. May. The wool is used by humming birds for their

nests, and the stipes and terminal buds are quite good to eat when young. From our area have been reported by Pepoon var. *frondosa* Gray, with some of the fronds sterile below and sparsely fertile at the summit, and var. *incisa* J. W. Huntington, with some of the inner pinnules pinnatifid.

ADDER'S TONGUE FAMILY (Ophioglossaceae)

Leafy and fleshy plants with erect rootstocks and clusters of fleshy roots; simple or branched fronds that are erect (not coiled) in bud; spore-bearing spikes or panicles contracted.

Veins netted; sporangia in a simple spike	*Ophioglossum* 1.
Veins not netted; sporangia in compound spikes	*Botrychium* 2.

1. OPHIOGLOSSUM L. Adder's Tongue

Rootstocks tuberous; sterile segment a simple, fleshy leaf; spore-bearing segment with fruit dots adhering, leathery, in 2 ranks on the edges of the fertile spike.

1. O. vulgatum L. Fronds 5-42 cm. tall, generally single; sterile segment sessile, near the middle of the plant, ovate, resembling the spathe of an aroid plant.—Rather rare, two plants seldom being seen together, and apt to be wholly absent in dry years; prairies and borders of Wolf Lake, and wet meadows and banks of rivers, and boggy woods, Miller to Miller Springs. In some years abundant near South Gary, acc. to Clute.

2. BOTRYCHIUM Sw. Moonwort

Sterile segment of the frond ternately compound; spore-bearing segment 1-3-pinnate, the divisions contracted and bearing 2-ranked fruit-dots.

Sterile segment more or less fleshy; base of the stalk closed..	*B. virginianum* 2.
Sterile segment thin; base of stalk open on one side.	
Ultimate divisions of the sterile segment ovate-oblong, acutish, crenate-serrulate	*B. ternatum* var. *obliquum* 1.
Ultimate divisions of the sterile segment ovate and obovate, more or less rounded at apex, somewhat lobed, and crenulate	*B. ternatum* var. *intermedium* 1.

1. **B. ternatum** (Thunb.) Sw. Stout, tall, with long-stalked fertile segments; sterile segments wide-spreading with many divisions; partly represented in our area by:

Var. obliquum (Muhl.) Milde. 1-4 dm. tall, somewhat leathery, the shape of the ultimate divisions variable. (*B. obliquum* Muhl.; B. *dissectum* forma Fernald.)—In rich woods, Miller to Michigan City, rare. September.

Var. intermedium D. C. Eaton. Fleshy, often loosely pubescent; sterile segment as much as 2 dm. broad; variable. (*B. obliquum* var. Underw.)—In open woods, sandy pastures, rare, Miller.

2. **B. virginianum** (L.) Sw. Fronds 3-6 dm. tall, broadly spreading; sterile segment sessile above the middle of the plant, ternate, broadly triangular, the short-stalked divisions once or twice pinnate and again pinnatifid, the oblong lobes cut-toothed at the apex; fertile part of the frond 2-3-pinnate.—Rare in rich woods, Miller and eastward back of the high dunes.

B. simplex E. Hitchcock was found by Clute at South Gary, but the station appears to be destroyed.

HORSETAIL FAMILY (Equisetaceae)

Rush-like plants with jointed, hollow, sometimes branching stems with creeping rootstocks and teeth-like sheaths (reduced leaves) around the joints; spore-bearing stems terminate in a spike-like conical fruiting mass consisting of shield-shaped scales on minute stalks, that bear spore-cases on the inner side.

1. EQUISETUM L. Horsetail

Rootstocks perennial; stems jointed, grooved, with a central cavity (centrum); joints solid, bearing toothed sheaths; branches, if any, whorled from the nodes, appearing leaf-like or needle-like; fruiting body a terminal cone of stalked sporophylls.

The rough stems, which contain silex, are sometimes used for scouring.

Stems annual, often with whorls of branches; spikes blunt.	
Centrum ½ to ⅔ the total diameter of the stem; stems with 10-14 deep furrows, branches 3-4-angled, solid, winged	*E. arvense* 1.
Centrum about ¾ the total diameter of the stem; stems with 10-30 shallow grooves, unbranched or with hollow wingless 4-6-angled branches	*E. limosum* 2.
Stems usually evergreen, simple or sparingly branched; spikes sharp-pointed.	
Centrum ⅓ the total diameter; teeth persistent	*E. variegatum* 4.
Centrum ¾ the total diameter; teeth deciduous	*E. laevigatum* 3.

1. **E. arvense** L. (*Common Horsetail.*) Sterile stems prostrate or erect, 0.5-5 dm. tall, branched; sheath teeth triangular-lanceolate, sharp, erect; fertile stems 0.5-2.5 dm. tall, with 8-12-toothed, loose sheaths, sometimes under aquatic conditions branched like the sterile stems.—Common in wet and dry situations; in our area frequent in cinders of the railroad embankments. Summer.

2. **E. limosum** L. (*Pipes.*) 3-15 dm. tall; sheaths with distinct rigid, acute, narrow, dark brown teeth. (*E. fluviatile* L.)—In shallow water and grassy margins of lakes, sloughs, and rivers. Wolf Lake, East Chicago, Clarke. June, July.

3. **E. laevigatum** A. Br. (*Scouring Rush.*) Annual or evergreen, 1-12 dm. tall, simple or occasionally branched; stem 4-13-grooved; sheaths widening upward, the lower with basal and terminal black

rings, these persistent after the fall of the sheaths. (*E. hyemale* var. *intermedium* A. A. Eaton.)—Sandy margins of ponds, occasional throughout. May-August.

4. E. variegatum Schleich. (*Scouring Rush.*) Stems ascending, tufted, 1.5-3 dm. tall, 5-10-grooved, slender; sheaths loose, green below, black-girdled above.—Around edges of sloughs; occasional, Miller, Dune Park and eastward on tamarack bogs.

CLUB MOSS FAMILY (Lycopodiaceae)

Moss-like, low plants with elongated stems and numerous small, mostly lanceolate, persistent leaves; spore dots solitary in the leaf axils or on the upper leaf surface; spores yellow.

1. LYCOPODIUM L. Club Moss

Evergreen perennials with 1-nerved, crowded, 4-16-ranked leaves; spore cases leathery, flattened, kidney-shaped, discharging the very light spores in an inflammable mass resembling sulphur powder.

Spore cases in the axils of dark green, shining leaves, not forming a terminal fruiting cone	*L. lucidulum* 1.
Spore cases forming a terminal fruiting cone.	
Bract leaves scale-like or yellowish	*L. inundatum* 5.
Bract leaves undifferentiated from others.	
Spore-bearing branches leafy to the cones	*L. obscurum* 2.
Spore-bearing branches borne on scaly stalks.	
Running stems deep in the ground; branches with numerous crowded divisions	*L. tristachyum* 4.
Running stems on or near the surface of the ground; branches looser and more openly forked	*L. complanatum* 3.

1. **L. lucidulum** Michx. Stems ascending, with the elongated old bases persistent from year to year; leaves broader above the middle, at first spreading, then reflexed, alternately shorter and longer, pointed and toothed; asexual reproduction by gemmae (buds) which drop from the plant.—In rich cool woods; not infrequent from Michigan City to Miller, but rare westward.

Var. porophilum (Lloyd & Underw.) Clute. Leaves very narrow, broadest below the middle. Habitat and range of the species.

2. **L. obscurum** L. var. dendroideum (Michx.) D. C. Eaton. Rootstock rope-like, subterranean, the upright stems like little trees, dichotomously forking; leaves very narrow, 6-ranked, incurved or erect; spikes 1-15.—In rich cool woods, Pine and Miller.

3. **L. complanatum** L. Stems erect, irregularly forked; branches flattened, glaucous, few-forked, erect, clothed with minute, overlapping, appressed, awl-shaped, 4-ranked leaves; peduncles 3 cm. long, with 1-3 spikes.—In dry coniferous woods, pine dunes, Miller and Dune Park.

4. **L. tristachyum** Pursh. Glaucous, stems erect with numerous branches; peduncles 8-12 cm. long with 1-5 spikes.—On wooded dunes, Dune Park, Miller.

5. **L. inundatum** L. Stems soft, dwarf; leaves very narrow, soft, spreading; spike short and thick.—Swamps, ditches and sphagnum bogs, Pine to Port Chester.

L. clavatum L. was reported from Miller by Higley, perhaps in error; it has scaly peduncles.

SELAGINELLA FAMILY (Selaginellaceae)

Small moss-like leafy plants with branching stems and small 4-6-rowed leaves; spore cases solitary, axillary or on upper leaf surface and enfolded by leaf margins; spores of 2 sizes.

1. SELAGINELLA Beauv. Selaginella

The small spores powdery, orange, in minute, oblong spore cases; larger spores angular, in large tumid spore cases in the lower axils of the 4-rowed sessile fruiting cone or spike; small spore cases in the upper part of the spike.

Leaves all similar, uniformly overlapping, rigid and opaque.. *S. rupestris* 1.
Leaves stipule-like below, shorter above, limp and pellucid... *S. apoda* 2.

1. **S. rupestris** (L.) Spring. 2-6 cm. tall and much branched in compact tufts; leaves very narrow and densely crowded, bristle-tipped, those of the 4-angular spike broader.—A curious little plant, grayish green, rigid and erect or rarely prostrate, resembling the moss, *Polytrichum commune*, with which it often grows. In dry pine woods and on dunes, rare but locally abundant throughout except the prairies.

2. **S. apoda** (L.) Fernald. Stems prostrate, tufted, creeping, much branched; leaves membranous; larger spore cases copious. (*S. apus* Spring.)—A very delicate little pale plant apt to be mistaken for a moss or *Jungermannia*. On wet sandy banks of sloughs, and of rivers, both in the Calumet District and the high dune country, but rare.

Subkingdom II

SEED PLANTS (Spermatophyta)

Normal reproduction by seeds containing an embryo or minute plant (thus differentiated from the spores of ferns). The sexual stage not found in a separate and differentiated plant, but as a few specialized germinal cells in the asexual plant. Plants bearing true flowers, containing pistils or stamens or both.

PINE FAMILY (Pinaceae)

Trees and shrubs with resinous juice and needle-like or scale-like leaves; flowers in short scaly catkins, the female flowers ripening into a cone or berry, or drupe.

Leaves needle-like, in bundles of 2 or more; fertile flowers of numerous spirally overlapping, scaly carpels subtended by persistent bracts, in fruit forming a cone.
  Leaves 2-5 in a bundle.............................. *Pinus* 1.
  Leaves numerous in each bundle...................... *Larix* 2.

Leaves scale-like (or rarely needle-like) and overlapping to form a flat "spray"; female flowers consisting of a few fertile scales becoming in fruit a small closed cone or a drupe.
  Leaves opposite, never needle-like, and more or less 2-rowed; sexes in separate flowers on the same tree; fruit a small closed cone...................... *Thuja* 3.
  Leaves not opposite except when needle-like, generally scaly but not 2-ranked; sexes on different plants; fruit berry-like with bony seeds.................. *Juniperus* 4.

1. PINUS L. Pine

Trees with evergreen leaves produced from chaffy bud scales sheathing the base of the cluster; male inflorescences small, obtuse; the fruit a cone of woody scales which spread apart when ripe, the seeds being winged, nut-like, situated at base of scale. In spring the pollen showers down in immense clouds; cones mature the second autumn.

Leaves in twos, cylindrical, short and thick; cone scales thickened at one end............................ *P. Banksiana* 1.

Leaves generally in fives, triangular, long, slender, whitened beneath; cone scales thin........................ *P. Strobus* 2.

1. P. Banksiana Lamb. (*Jack Pine, Grey Pine, Northern Scrub Pine.*) Tree of short stature with rough gray bark and straggling irregular crown; leaves divergent, contorted, 2-3 cm. long; cones 4-5 cm. long, oblong, conical, oblique, the tip generally recurved. (*P. divaricata* DuMort.)—In sterile sandy soil, making up the "pine barrens" between Gary and Indiana Harbor, also frequent on dunes eastward from Miller. Our area is its southernmost station. This, the commonest conifer of our region, is an unattractive tree with inferior wood except for fuel. The cones rarely open fully unless charred by fire.

2. P. Strobus L. (*White Pine.*) Frequently a lofty tree of graceful aspect with dark purplish smooth bark, the branches in whorls; leaves glaucous, straight; cones narrow, cylindrical, sometimes curved in the middle, nodding, 1-1.5 dm. long. (*Strobus* Small.)—A handsome tree with light soft pale useful wood; but there are no commercial stands of this tree in our area. Frequent on the front dunes from Miller eastward; the second most abundant conifer of our region.

2. LARIX Mill. Larch

Leaves developing from scaly buds in early spring, deciduous in autumn, short and limp; catkins lateral, terminating short woody spurs, developed in early spring; cones with thin persistent scales, small.

1. **L. laricina** (Du Roi) Koch. (*Tamarack.*) A slender tree with dark scaly bark and pale green needles 1-2.5 cm. long; cones 1.2-2 cm. long, ovoid, few-scaled.—The wood is resinous, hard, and strong; a beautiful tree, locally found in cold swamps and on bogs, as at Miller, Dune Park, Mineral Springs, and Tamarack Station. This, the third most abundant of our conifers, makes up the arboreal growth of a large part of the famous bog at Mineral Springs.

3. THUJA L. Arbor-vitae

Leaves of 2 sorts, on different branchlets, awl-shaped, or bluntly scale-like; fruit like a small bony cone of fused, greenish scales.

1. **T. occidentalis** L. (*White Cedar.*) Branchlets 2-angled; leaves appressed, in 4 rows, forming a flat "spray"; seeds broadly winged.—A low tree with pale red, shredding bark and light, strong, soft wood; in cold swamps and on bogs, Mineral Springs to Miller and occasionally westward; fourth commonest conifer of our area.

4. JUNIPERUS L. Juniper

Aromatic-oily trees or shrubs with resinous juice and leaves of 2 sorts, needle-like or scale-like and overlapping; fruit a bluish-black, glaucous, scale-bracted sort of berry; seeds 1-3, wingless.

Leaves in whorls of 3, free and jointed at base, prickly-pointed, linear-subulate, channeled and whitened above.	
Erect, 2-4 m. tall; leaves 12-21 mm. long, grayish beneath.	*J. communis* 1.
Depressed, forming large mats, 3-10 dm. tall, leaves 8-13 mm. long, with a white stripe beneath	*J. communis* var. *depressa* 1.
Leaves mostly opposite, sometimes awl-like and loose, or scale-like and overlapping and crowded, with a resin gland on the back..............................	*J. virginiana* 2.

1. **J. communis** L. (*Common Juniper.*) Leaves thin, straight, 1.5 mm. broad at base, needle-pointed, widely spreading; berry 6-8 mm. thick, subglobose.—Rather rare, on open dunes, as on Mt. Tom, growing with the dune cactus, *Opuntia Rafinesquii.*

Var. **depressa** Pursh. (*Dwarf Juniper.*) The depressed mats often four or five meters across; berry 6-10 mm. thick.—More common than the species, but not abundant except quite locally in a few places on the high dunes, where its prostrate growth habit is most striking.

2. **J. virginiana** L. (*Red Cedar.*) Pyramidal shrub or small tree with reddish, shreddy bark and erect branches, the foliage black-green on older branches and overlapping-scaly, light green and glaucous on vigorous young shoots and needle-like, curved; berries about 6 mm. thick, edible.—Occasional on dunes or in pastures, rarely in swamps, Mineral Springs to Miller and rarely westward. This, the fifth most abundant conifer of our area, has aromatic and commercially valuable wood.

CAT-TAIL FAMILY (Typhaceae)

Root perennial; leaves grass-like or sword-like; flowers on a spadix, petals and sepals none; ovary surmounted by a 1-sided stigma; fruit small, nut-like.

1. TYPHA L. Cat-tail

Rootstocks creeping; stems erect, fleshy, unbranched; leaves sheathing the stem at the base; flowers in long spikes, the upper part male, consisting of stamens and long hairs, the lower part female, composed of ovaries, covered with long bristles; fruit surrounded by silky hairs. The whole flowering spike is brown and compact at flowering time, and at fruiting season, in the winter, becomes downy-silky, the fruits and hairs being dispersed by wind.

Male and female part of the spike continuous.............	*T. latifolia* 1.
Male and female parts of the spike separated by a short extent of the naked axis..................................	*T. angustifolia* 2.

1. **T. latifolia** L. (*Common Cat-tail.*) Stout, 1-2 m. tall, the flat leaves up to 23 mm. broad; pistillate flowers bractless.—In marshes, along river margins, and on bogs, covering vast areas in our region. Summer.

2. **T. angustifolia** L. (*Narrow-leaved Cat-tail.*) Similar, the leaves not over 12 mm. broad, somewhat convex on the back; female flowers with a hair-like bract.—In more brackish or limy waters, less common. Summer.

Var. **calumetensis** Peattie. Similar to the species, but very slender, the leaves 1.5-3 dm. long, 3-6 mm. broad, often inrolled; male portion of the inflorescence only 4 mm. broad, 7 cm. long; female 3-10 cm. long, 3-10 mm. broad; naked interval about 6 cm. long.—Marshes along the Grand Calumet, a local endemic.

BUR-REED FAMILY (Sparganiaceae)

Flowers arranged in globular heads, the upper male, having 3 sessile stamens and minute irregular scales, the lower composed of numerous female flowers with a calyx-like involucre of 3-6 linear or spatulate scales; fruit obovoid or spindle-shaped, in ours like a head of burs. Aquatic or mud plants, somewhat sedge-like in aspect, ours flowering in May and June, fruiting in July and August.

1. SPARGANIUM L. Bur-reed

Rootstock fibrous, creeping, perennial; flowers in heads, scattered along the upper part of the stem; fruit a big bur-like ball, the ripened pistils breaking off separately.

Leaves keeled and sword-like; mature fruit sessile, broadly wedge-shaped or obpyramidal; stigmas 2; sepals almost as long as the body of the fruit...................	*S. eurycarpum* 1.

Leaves flat and grass-like or obscurely keeled; mature fruit (sometimes obscurely) stalked, longer than the sepals, equally narrowed to the summit and bases; stigmas 2.

Fruiting heads 1.5-2.5 cm. thick; mature carpels strongly spindle-shaped, 4.5-5.5 mm. long, the slender beak 1.5-5 mm. long; fruit stalk 2-3 mm. long; male heads spindle-shaped, 4.5-5.5 mm. long, the slender beak 1.5-5 mm. long; fruit stalk 2-3 mm. long; male heads 1-6; leaves 6-12 mm. broad...................... *S. americanum* 2.

Fruiting heads 5-12 mm. in diameter; mature carpels ellipsoid or slenderly spindle-shaped, 3-3.5 mm. long; beak and fruit stalks obsolete or very short; leaves 2-4 mm. broad................................ *S. minimum* 3.

1. **S. eurycarpum** Engelm. Stems stout, erect, 8-13 dm. tall; fruit angled, often 2-seeded, with a broad and depressed summit abruptly tipped in the center. Branches and bract-leaves rather rigid. —A curious coarse plant. Shallow water of Wolf Lake and generally eastward.

2. **S. americanum** Nutt. Stoutish, 3-7 dm. tall; bracts divaricate, recurved-ascending, scarious-margined; inflorescence strict, simple; female heads all axillary.—Rare, Dune Creek, in shallow water, and perhaps elsewhere.

3. **S. minimum** Fries. Slender, 1-4 dm. tall; leaves usually floating; bracts narrow, not scarious-margined; inflorescence simple. —A delicate little plant, rare, in shallow water at Clarke and Pine, not apparently known elsewhere in our region.

WATER-PLANTAIN FAMILY (Alismaceae)

Roots fibrous; stems scape-like; leaves petiolate, sheathing, radical; flowers whorled in a loose raceme or panicle, perfect, or with sexes on different flowers or on different plants; perianth of 3 green sepals and 3 white petals; stamens 6 or more; ovaries numerous, distinct; fruit usually an achene.

Sexes usually not in the same flower; carpels flattened, in a dense head.................................. *Sagittaria* 1.

Sexes in the same flower................................ *Alisma* 2.

1. SAGITTARIA L. Arrowhead

Perennial herbs with somewhat milky juice; leaves usually arrow-shaped, the long petioles sheathing the stem; flowers whorled in threes, the lower flowers female, the later or upper ones male; sepals reflexed in fruit; petals white; stamens numerous and indefinite in number; ovaries crowded into a globular head on a receptacle; fruit thin, winged and often beaked.

Leaves not arrow-shaped, or if slightly so then the basal lobes much shorter than the terminal portion; filaments glandular-pubescent, shorter than the ovate anthers; bracts more or less jointed; fruiting heads small.

Beak of the achene erect or nearly so; flowers of the lowest whorl almost sessile.................... *S. heterophylla* 1.

Beak strongly incurved; flowers all pedicelled.......... *S. graminea* 2.

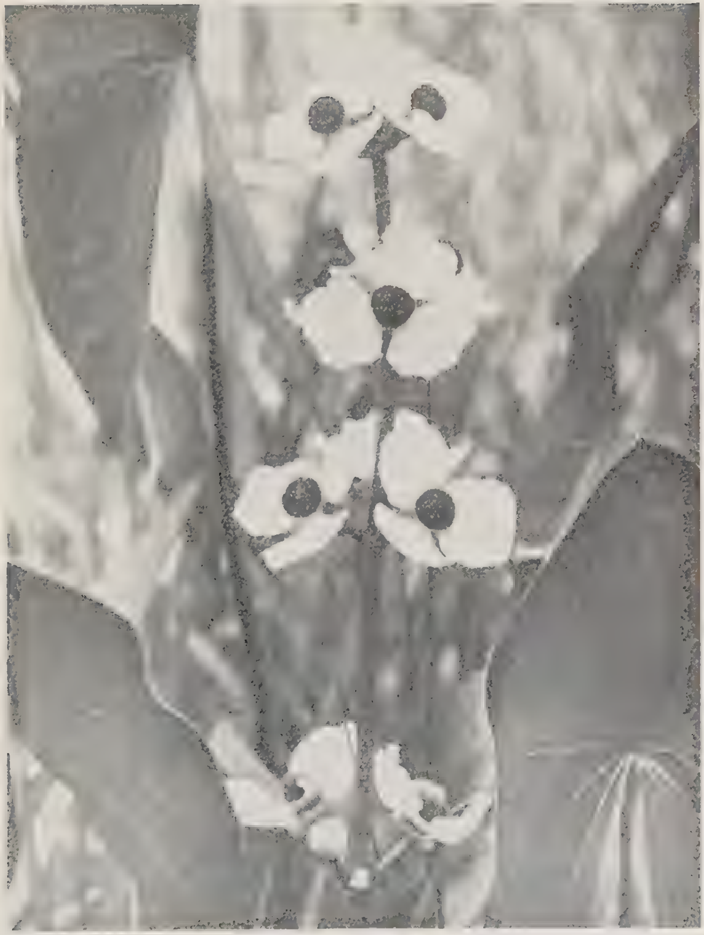


FIG. 1. ARROWHEAD (*Sagittaria latifolia*)

Leaves arrow-shaped, the basal lobes nearly or quite as long as the terminal portion; filaments as long as, or longer than the slender anthers; bracts distinct; fruiting heads small .... *S. latifolia* 3.

1. **S. heterophylla** Pursh. Stem weak, procumbent; leaves lanceolate or lance-oval, rarely with one or two narrow basal appendages; flowers of the lower whorl sessile, of the upper pedicellate.—Occasional in waters of the Calumet River system and Long Lake. Summer.

Var. *rigida* (Pursh) Engelm. with rigid, narrowly lanceolate leaf blades and var. *angustifolia* Engelm. with narrowly linear blades, both nothing but inconstant leaf forms, have been found in our area.

2. **S. graminea** Michx. Similar to the preceding; stem erect; leaves ovate-lanceolate to linear on slender petioles; pedicels slender, spreading; flowers white or roseate; achene 1 mm. long, winged on the back, scarcely beaked.—In sloughs, Clarke to Miller and Tamarack Sta. Summer.

3. **S. latifolia** Willd. Stem angled; lobes at the base of the leaf triangular; petals shining white; pedicels of female flowers twice as long as those of the male; achenes 2 mm. long, winged on both margins; beak horizontal, strongly incurved. (*S. variabilis* Engelm.)—Very common in sloughs, wet grass lands, ponds and streams, throughout, especially Wolf Lake. Summer. Variable as to outline of leaf; from our area are recorded forma *obtusa* (Muhl.) Robinson with obtuse, broadly arrow-shaped leaves, and forma *gracilis* Robinson with oblong-lanceolate blades and acute basal lobes.

2. ALISMA L. Water Plantain

Flowers small, greenish white, in a panicle.

1. **A. Plantago-aquatica** L. Perennial; root bulb-like but solid; stem with whorled branches; leaves acute at tip, ovate or oblong, rounded or heart-shaped at base, long-petioled, 3-9-nerved, the panicle overtopping the leaves, twice or thrice whorled; petals only 2-4 mm. long, whitish with yellow base, or pinkish; carpels furrowed on the back. (*A. subcordatum* Raf.)—In mud or shallow water, common in our area. Summer.

WATERWEED FAMILY (Elodeaceae)

Flowers regular, from a spathe, with simple or double floral envelopes, those in the fertile flowers united with a tube coherent with the ovary; stamens 3-12, distinct or united at the base; stigmas 3 or 5; fruit ripening under water, many-seeded. (*Hydrocharitaceae.*)

Stem elongated, submerged, leafy; spathes small, sessile..... *Elodea* 1.

Stem none, the leaves all narrow, elongated, the female flowers at length raised to the surface on long peduncles; spathes pedunculate..................... *Vallisneria* 2.

1. ELODEA Michx. Waterweed

Perennials with transparent, sessile, opposite or whorled leaves, the sexes on separate plants, or sometimes no male flowers present; flowers solitary in a small sessile spathe; male flowers when present minute, with 3 sepals united at base and 3 petals, breaking loose and rising to the surface where they shed pollen on the female flowers which are elevated to the surface on the long calyx tube; the female flowers with six small perianth lobes; ovary one.

1. **E. canadensis** Michx. Leaves firm, overlapping, oblong, obtuse; a few filaments without anthers are found in the female flowers. (*Philotria* Britton; *Anacharis* Babingt.)—Locally abundant in limy ponds and lakes, especially Wolf Lake. Has spread to Europe as a weed, where it has become a great pest.

2. **E. Nuttallii** (Planchon) St. John. Leaves lance-oblong, firm; male flowers with a lanceolate spathe. (*Philotria* Rydb.; *Anacharis* Planchon.)—In deep water, Wolf Lake.

2. VALLISNERIA L. Eel Grass. Tape Grass

Leaves submerged or floating at the tips, transparent and ribbon-like; sexes on separate plants; male flowers borne in a 3-valved spathe which is on a short scape; stamens 3; calyx 3-parted; female flowers with the calyx united into a long tube adherent to the ovary; stigmas 3, 2-lobed; petals in both kinds of flowers 3, linear; fruit resembling an elongated cylindrical berry which is ultimately drawn down under the water to ripen in the mud. The male flowers break loose and rise to the surface of the water, discharging their pollen on the female flowers which are elevated to the surface on elongated scapes.

1. **V. americana** Michx. Leaves ascending, obscurely serrulate, obtuse, nerved and net-veined, the peduncles not spiral as in the European species. (*V. spiralis* of auths., not L.)—In deep water, Wolf Lake. The fruit is a favorite food of water-fowl. Summer.

PONDWEED FAMILY (Potamogetonaceae)

More or less submersed aquatics with stems jointed and leafy; flowers perfect, spiked or clustered; perianth in our species 4-parted; stamens and ovaries 4; fruit a compressed drupe-like nut.

1. POTAMOGETON L. Pondweed

Submerged leaves thin and filmy, often dissected; floating leaves, when present, firmer; flowers in peduncled spikes above the water; sepals 4, opposite the stamens.

Leaves of 2 sorts, firm floating ones with expanded petioled blades and narrower submersed ones.
  Submersed leaves filiform or narrowly linear, at most 2 mm. broad.
    Spikes all alike, cylindrical .... *P. natans* 1.

Spikes of 2 sorts, one cylindrical, emersed and many-flowered, the other submersed, few-flowered and globular.................................. *P. hybridus* 15.

Submersed leaves lanceolate or ovate, if narrower, then at least more than 2 mm. broad.

Floating leaves heart-shaped at base................. *P. pulcher* 3.

Floating leaves rounded or tapering at base.

Floating leaves 30-50-nerved...................... *P. amplifolius* 4.

Nerves fewer.

Mature spikes 1.5-3.5 cm. long.................. *P. heterophyllus* 6.

Mature spikes 4-5.5 cm. long or if shorter with leaves 18-24-nerved.

Submersed leaves mucronate................. *P. angustifolius* 7.

Submersed leaves only acuminate.

Submersed leaves broadly lanceolate or oblong-elliptical; fruit tipped by a style .... *P. illinoensis* 5.

Submersed leaves narrowly lanceolate; stigma sessile on the fruit.................. *P. lonchitis* 2.

Leaves all submersed and similar.

Leaves lanceolate, oblong or broader.

Leaves short-petioled or sessile.

Leaves serrulate................................ *P. crispus* 11.

Leaves entire.................................. *P. lucens* 8.

Leaves clasping.

Stipules 1-2 cm. long, persistent as shreds; leaves lance-attenuate................................ *P. Richardsonii* 9.

Stipules short and inconspicuous; leaves from suborbicular to oblong-lanceolate. .... *P. perfoliatus* 10.

Leaves linear to setaceous.

Stipules united with the sheathing leaf-base; spikes interrupted.

Leaves entire, not over 3 mm. broad.............. *P. pectinatus* 16.

Leaves serrulate, 4-8 mm. broad.................. *P. Robbinsii* 17.

Leaves free from stipules or if slightly adhering to them, then with globose spikes in their axils.

Fruit flat; spikes globular in leaf axils.............. *P. hybridus* 15.

Fruit plump; spikes terminal or nearly so.

Principal leaves over 1 mm. broad.

Leaves many-nerved........................ *P. compressus* 12.

Leaves 3-7-nerved .... *P. foliosus* var. *niagarensis* 14.

Principal leaves less than 1 mm. broad.

Branches mostly tipped with large winter buds.. *P. strictifolius* 13.

Winter buds absent.......................... *P. foliosus* 14.

1. **P. natans** L. Floating leaves 2.5-10 cm. long, ovate, 21-29-nerved; upper submersed leaves lanceolate, ephemeral, lower submersed leaves very long and slender, with long acute stipules; peduncles as thick as the stem; spikes 3-6 cm. long.—In deep and shallow water, Wolf Lake and the Grand Calumet. Its handsome floating leaves are conspicuous in summer.

2. **P. lonchitis** Tuckerm. Floating leaves lance-oblong or long-elliptical, 17-23-nerved, long-petioled; submersed leaves very long, lanceolate, 7-15-nerved, coarsely cross-veined; peduncles somewhat thickened upward. (*P. americanus* Chamisso & Schlecht., not R. & S.)—In deep water, Wolf Lake and the Calumet River region.

3. **P. pulcher** Tuckerm. Stem black-spotted, usually not branched; floating leaves large, roundish, ovate, 25-37-nerved, all alternate; upper submersed leaves 3-5, lanceolate, very long-acuminate, 10-15-nerved, thin and flaccid, with cross veins, wavy; lowest leaves 2-4, thicker, flat, oval or oblong; peduncles thicker than the stem; spike 2-4 cm. long. (*P. lucens* var. *fluitans* Robbins.)—A very handsome and showy-leaved species floating in quiet waters of pools at Pine and Dune Park; a coastal plain species, rare.

4. **P. amplifolius** Tuckerm. Floating leaves when present large, oblong, ovate or elliptic; submersed leaves very large, lanceolate or oval, wavy-margined, much recurved on short petioles; stipules large, tapering; peduncles thickened upward; fruit 4-5.5 mm. long.—In deep water, Calumet River and Wolf Lake.

5. **P. illinoensis** Morong. Floating leaves opposite, oval or elliptic, 19-27-nerved, short-pointed, on short petioles; submersed leaves oblong-elliptical, 1-2 dm. long; stipules coarse; peduncles thickened upward; spikes 4-5 cm. long.—In ditches, Clarke.

6. **P. heterophyllus** Schreb. Floating leaves thin, 9-17-nerved; submersed leaves lanceolate, stiffish, 3-7-nerved; stipules loose; peduncles short.—Variable as to leaf shape. In quiet water, Wolf Lake and the Calumet River.

7. **P. angustifolius** Bercht. & Presl. Upper leaves sometimes floating, leathery, 13-21-nerved, long-petioled, like the short-petioled submersed leaves, crispy, shining, lanceolate, numerous.—In lagoons and sloughs, Pine. Late in the season the submersed leaves appear, the earlier submerged ones becoming ultimately the emersed ones.

8. **P. lucens** L. Stem thick and branching; leaves petioled, oval or lanceolate, pointed, 13-nerved, crispy, shining; peduncles long; spike thick.—In deep water, Wolf Lake and the Calumet River system.

9. **P. Richardsonii** (Benn.) Rydb. Leaves 13-23-nerved, long, lanceolate from a cordate-clasping base, wavy and pale; peduncles long, spongy; spikes 1.5-3.5 cm. long.—In deep water, Wolf Lake and the Calumet River system.

10. **P. perfoliatus** L. Similar to the preceding, the leaves orbicular, crispy, obtuse, 15-27-nerved; stipules rare; peduncles spongy. (*P. Loeselii* R. & S.) —In deep water, Wolf Lake.

11. **P. crispus** L. Leaves wavy, 3-5-nerved, sessile or clasping, linear-oblong; stipules small, ephemeral; spikes about 1 cm. long. —In deep water, Wolf Lake. Nat. from Eu. Reproducing by bur-like winter buds which are really hardened branches and leaf bases.

12. **P. compressus** L. Stem flattened, with marginal wings; leaves thin, grass-like, with three prominent, and various smaller, nerves; stipules long; peduncles more than twice as long as the cylindrical spike. (*P. zosterifolius* Schumacher.)—In deep water, Wolf Lake.

13. **P. strictifolius** Benn. Leaves rigidly ascending, 3-nerved, the central one prominent, margins revolute; peduncles rigid; stipules

short, filmy, veiny, appressed; spikes short, slightly interrupted. —In deep water, Wolf Lake.

14. **P. foliosus** Raf. Stem flattish, much branched, very slender; leaves narrowly linear, acute, obscurely 3-nerved; spikes on short club-shaped peduncles, capitate, 1-4-flowered.—In quiet waters, Wolf Lake.

Var. niagarensis (Tuckerm.) Morong. Stems very long; leaves 3-5-nerved at base, acute and mucronate, narrowed to a subpetiolate base, 4-9 cm. long.—Wolf Lake, quiet water.

15. **P. hybridus** Michx. Floating leaves when present oval to lance-oblong, longer than the very slender petioles, with 5-7 deeply impressed nerves; submersed leaves numerous, setaceous; peduncles frequently recurved; spikes 1-4-flowered, submersed. (*P. diversifolius* Raf.)—In quiet shallow waters, Mud Lake.

16. **P. pectinatus** L. Leaves very narrow, with hard sharp points, 1-nerved or nerveless; stipules with conspicuous papery margins; peduncles very slender and long; spikes in interrupted whorls.—Very common in Wolf Lake and the Grand Calumet; plants often producing stolons with buds.

17. **P. Robbinsii** Oakes. Stems ascending from a creeping base, rigid, branching; leaves crowded in 2 ranks, spreading, recurved, very narrow, teeth translucent, many-nerved; stipules bristly; spikes numerous on short peduncles, loosely few-flowered.—In shallow water, Wolf Lake and the Grand Calumet.

NAIAD FAMILY (Naiadaceae)

Flowers axillary, with no true perianth; the single stamen enclosed in a sheath; pistils 1-5, enclosed by a cup-shaped sheath; sexes united or separate. Aquatic herbs.

Plants rooting in the mud; leaves alternate................	*Zannichellia* 1.
Plants floating; leaves opposite or in threes..............	*Naias* 2.

1. ZANNICHELLIA L. Horned Pondweed

Submersed plants with 2-5 pistils borne in the same cup-like involucre; style beak-like, stigma broad, cup-shaped, topping the obliquely oblong fruit.

1. **Z. palustris** L. Rootstocks creeping; fruits 2-6 in a cluster. —In deep water, common in Wolf Lake; the plants fruit under water.

2. NAIAS L. Naiad

Submersed plants with crowded sessile leaves; flowers solitary, small; stamen borne in a thin spathe; female flower containing one ovary with a short style and 2 awl-shaped stigmas; fruit a seed-like nutlet borne in a loose thin cover.

Fruits 2.5-3 mm. long; sheaths with 5-10 teeth on each margin.	*N. flexilis* 1.
Fruit 2 mm. long; sheath margins 40-50-toothed.............	*N. guadalupensis* 2.

1. **N. flexilis** (Willd.) Rostk. & Schmidt. Stems and leaves very narrow, the latter beset with numerous minute teeth; fruit narrowly oblong; sheaths shining, faintly reticulated.—In deep water, Wolf Lake, and lagoons at Pine.

Var. **robusta** Morong. Stem stout, sparsely branching, elongated; leaves few, flat, strongly ascending.—In mud of the Grand Calumet at Hammond; perhaps elsewhere.

2. **N. guadalupensis** (Spreng.) Morong. Stem very slender, 3-6 dm. long, widely branched from the base; leaves numerous, opposite or in fascicles, frequently recurved; seeds dull, strongly reticulated. —In deep water, Wolf Lake.

ARROW-GRASS FAMILY (Triglochinaceae)

Marsh plants, the leaves like hollow quills, without distinction between blade and petiole; flowers perfect, spicate or racemose with a 6- (rarely 3-) lobed perianth; carpels 3 or 6, more or less united, separating in fruit; fruit a capsule. (*Juncaginaceae; Scheuchzeriaceae.*)

Leaves on the stem; flowers bracted, in a raceme.............	*Scheuchzeria* 1.
Leaves all basal; flowers bractless, in a spike...............	*Triglochin* 2.

1. SCHEUCHZERIA L. Bog Arrow-grass

Low bog herb with jointed, creeping rootstock; stem sheathed by bases of the folded, grass-like leaves which are tubular at apex; sepals and petals greenish yellow, the latter persistent; stamens 6; ovaries 3, slightly united at base, in fruit forming 3 diverging, inflated, 1-2-seeded pods.

1. **S. palustris** L. var. **americana** Fernald. Stem zigzag; raceme loosely few-flowered; flowers 3-4 mm. long; pods having a minute curved beak; seeds dark.—On peat bogs and wet shores, Miller, Dune Park, Tamarack, etc. Summer.

2. TRIGLOCHIN L. Arrow-grass

Perennials with rush-like, fleshy leaves which sheath the base of a naked jointless stem; sepals and petals greenish, deciduous; stamens 3-6; pistils united in a 3-6-celled ovary; stigmas sessile; capsule splitting into 3-6 separate carpels.

Fruit ovoid, prismatic, about 2 times as long as thick.........	*T. maritima* 1.
Fruit clavate or linear-prismatic, 3-5 times as long as thick......	*T. palustris* 2.

1. **T. maritima** L. Stem 1.5-7.5 cm. tall, thickish; leaves thickish; fruit acutish, mostly 6-carpellate, rounded at base. —Brackish marshes and bogs, frequent locally, from Mineral Springs westward. Summer.

2. **T. palustris** L. Stem 5-50 cm. tall, slender; leaves slender; fruit mostly 3-carpellate, acute at base.—Brackish marshes and bogs, Clarke and Pine, rare. Summer.

GRASS FAMILY (Gramineae)

Text prepared in collaboration with Neill Hotchkiss

Herbs in our genera with usually hollow stems (culms), or solid in *Andropogoneae*, closed at the nodes and simple or branched. Leaves two-ranked and alternate, parallel-veined, and usually linear, composed of a sheath surrounding the stem, with margins usually free and overlapping, a free blade, and at the point of union of the two, on the inside, a small membranous or hairy appendage, the ligule, sometimes not apparent. Inflorescence a panicle, raceme or spike. Flowers usually small and not radially symmetrical nor with a distinct perianth, occurring singly or aggregated in a spikelet composed of two or more bracts in two ranks on opposite sides of a shortened branch, the rachilla. Lowest two bracts (glumes) empty; each succeeding bract (lemma) having in its axil a flower of usually three stamens, a one-celled, one-ovuled ovary, usually two feathery stigmas, and two inconspicuous scales, the lodicules; the whole subtended and usually surrounded by another bract, the palea, directly above the lemma. Floret composed of lemma, palea and flower. Fruit a caryopsis often enclosed at maturity in the lemma and palea. Glumes, lemma, and palea often variously modified. Florets staminate, pistillate, or sterile.

The family includes the cultivated cereals and a few ornamental plants. The grasses of our area while not exhibiting unusual variety are perhaps the most characteristic single family of the floral aspect of the area, dominating prairies, strands, dunes, and dunes meadows, swales and sloughs.

KEY TO THE TRIBES

Spikelets with 1 perfect terminal floret and a sterile or staminate floret below (except for the pedicelled spikelets of *Andropogoneae*); spikelets usually somewhat dorsally compressed; rachilla jointed immediately below the spikelet or cluster of spikelets which falls at maturity entire.

  Spikelets usually of two somewhat dissimilar forms, occurring in pairs, one sessile and perfect, the other pedicelled and staminate, sterile, or obsolete; glumes firmer than the lemmas and palea................ *Andropogoneae* I.

  Spikelets all alike; fertile lemma and palea firmer than the glumes....................................... *Paniceae* II.

Spikelets one-many-flowered; rudimentary florets, if any, above (except in *Phalarideae* with 2 below); spikelets usually laterally compressed (dorsally in *Milium*); rachilla usually jointed above the glumes which remain on the pedicel after the florets fall at maturity. (In *Oryzeae*, *Cinna*, *Sphenopholis*, and *Spartina* the rachilla is jointed below the floret which is more or less laterally compressed.)

- Spikelets of one fertile floret with 2 staminate or sterile florets below and unlike the fertile lemmas; inflorescence a panicle............................ *Phalarideae* IV.
- Spikelets of one or more fertile florets with sterile lemmas, when present, above the fertile florets.
  - Glumes none, except in the staminate spikelets of *Zizania;* rachilla jointed below the glumes; inflorescence a panicle............................ *Oryzeae* III.
  - Glumes present, minute in *Brachyelytrum;* rachilla usually above the glumes (below in *Cinna, Sphenopholis* and *Spartina*).
    - Spikelets sessile, the inflorescence a spike.
      - Spikes solitary; spikelets in 2 rows on opposite sides of the rachis.......................... *Hordeae* IX.
      - Spikes several, racemosely arranged; spikelets in 2 rows on one side of the rachis only........... *Chlorideae* VII.
    - Spikelets pedicellate, the inflorescence an open, contracted or spike-like panicle.
      - Spikelets 1-flowered.......................... *Agrostideae* V.
      - Spikelets 2-many-flowered.
        - Glumes as long as the first floret, usually exceeding the uppermost; lemmas usually awned from the back (from between the teeth at the apex in *Danthonia;* awnless in *Koeleria* and *Sphenopholis*)....................... *Aveneae* VI.
        - Glumes shorter than the first floret; lemmas awnless or awned from the tip (from between minute teeth at the apex in *Bromus*)..... *Festuceae* VIII.

KEY TO THE GENERA, BY TRIBES

Tribe I. ANDROPOGONEAE

- Inflorescence of spike-like racemes, occurring singly or digitately aggregated; racemes with several joints....... *Andropogon* 1.
- Inflorescence a panicle composed of racemes reduced usually to not more than 2 or 3 joints.
  - Pedicellate spikelets wanting, but the pedicels present.... *Sorghastrum* 2.
  - Pedicellate spikelets present......................... *Holcus* 3.

Tribe II. PANICEAE

- Spikelets inclosed in a bur-like involucre; burs racemose and falling entire.............................. *Cenchrus* 10.
- Spikelets not inclosed in a bur-like involucre.
  - Spikelets subtended by one or more slender bristles; inflorescence dense and spikelike.................... *Chaetochloa* 9.
  - Spikelets not subtended by bristles; inflorescence not spikelike.
    - Spikelets awned................................. *Echinochloa* 8.
    - Spikelets awnless.
      - Inflorescence an open panicle.
        - Florets chartaceous-hardened, the margin of the lemma inrolled; first glume well-developed... *Panicum* 7.
        - Florets cartilaginous, the margins of the lemma flat, white, hyaline; first glume rudimentary..... *Leptoloma* 5.

Inflorescence composed of one or more 1-sided, spike-like racemes.

Racemes digitate; fertile lemmas cartilaginous, the margins not inrolled .... *Digitaria* 4.

Racemes racemose; fertile lemmas chartaceous, the margins inrolled .... *Paspalum* 6.

Tribe III. ORYZEAE

Spikelets unisexual; staminate and pistillate flowers in separate, dissimilar spikelets; staminate spikelets on the spreading lower branches, the pistillate on the ascending upper branches of the panicle .... *Zizania* 11.

Spikelets all perfect and similar in a loose panicle .... *Leersia* 21.

Tribe IV. PHALARIDEAE

Lower florets staminate, as large as the perfect floret .... *Hierochloe* 14.

Lower florets sterile, much smaller than the perfect floret ... *Phalaris* 13.

Tribe V. AGROSTIDEAE

Rachilla jointed below the glumes, the spikelets falling entire; lemma awned from just below the tip .... *Cinna* 28.

Rachilla jointed above the glumes which remain on the pedicels after the florets fall.

Lemma conspicuously firmer than the glumes, the nerves obscure.

Lemma awnless, dorsally compressed; callus lacking ..... *Milium* 15.

Lemma awned, nearly terete; callus conspicuous and usually densely bearded.

Awn 3-parted .... *Aristida* 18.

Awn simple, jointed with the summit of the lemma.

Awn much twisted, stout and persistent; callus sharp. *Stipa* 17.

Awn not strongly twisted, slender and deciduous; callus blunt .... *Oryzopsis* 16.

Lemma not firmer than the glumes, the nerves usually evident, though sometimes densely bearded.

Lemma pointed or awned from the tip; inflorescence narrow or spike-like.

Lemma 1 cm. long; rachilla prolonged behind the palea .... *Brachyelytrum* 20.

Lemma 3 mm. long or less; rachilla not prolonged .... *Muhlenbergia* 19.

Lemma awnless or awned from the back.

Inflorescence a dense spike-like panicle; glumes strongly compressed-keeled.

Spikelets about 12 mm. long; plants with stout rhizomes .... *Ammophila* 27.

Spikelets less than 5 mm. long; plants without rhizomes ....

Glumes much exceeding the lemma, abruptly awned. *Phleum* 22.

Glumes not exceeding the lemma, awnless ...... *Heleochloa* 21.

Inflorescence an open or somewhat contracted panicle; glumes not conspicuously compressed-keeled.

- Lemma smooth or nearly so at the base.
  - Glumes longer than the 3-nerved lemma........ *Agrostis* 24.
  - Glumes not longer than the 1-nerved lemma, usually shorter........................ *Sporobolus* 22.
- Lemma with a densely bearded callus at the base.
  - Glumes longer than the lemma, short-awned from the back............................ *Calamagrostis* 26.
  - Glumes shorter than the lemma, awnless........ *Calamovilfa* 25.

Tribe VI. AVENEAE

- Lemma awnless; glumes scarcely as long as the florets.
  - Panicle narrow but loose; glumes distinctly different in shape...................................... *Sphenopholis* 29.
  - Panicle dense and spike-like; glumes similar in shape..... *Koeleria* 30.
- Lemma awned; glumes conspicuously longer than the florets.
  - Lemma awned from the back, the awn not flattened (only a rudiment of an awn in some varieties of *A. sativa*). *Avena* 31.
  - Lemma awned from between the teeth of a bifid apex, the awn flattened and twisted...................... *Danthonia* 32.

Tribe VII. CHLORIDEAE

Represented in our area only by........................ *Spartina* 33.

Tribe VIII. FESTUCEAE

- Rachilla with abundant long hairs, giving the large plume-like inflorescence a silky appearance; plants stout, usually 2 m. or more high.............................. *Phragmites* 34.
- Rachilla without long silky hairs; plants slender, usually less than 1.5 m. tall.
  - Spikelets crowded in dense, 1-sided clusters at the end of the panicle branches, forming a compact or rather open inflorescence................................ *Dactylis* 36.
  - Spikelets not in dense, 1-sided clusters.
    - Lemmas conspicuously 3-nerved.................... *Eragrostis* 35.
    - Lemmas 5-7-nerved; nerves often obscure.
      - Nerves prominent, not converging at the blunt tip of the lemma.............................. *Glyceria* 38.
      - Nerves usually not prominent, converging at the acute or awned tip of the lemma.
        - Lemma keeled, awnless........................ *Poa* 37.
        - Lemma rounded on back, usually awned.
          - Spikelets, excluding awns, usually not over 1 cm. long; lemmas acute or awned from the tip.. *Festuca* 39.
          - Spikelets, excluding awns, 1.5-2.5 cm. or more long; lemmas acute or with an awn from between two minute teeth at the summit.. *Bromus* 40.

Tribe IX. HORDEAE

- Spikelets single at each rachis joint.
  - Plants perennial; glumes oblong or lanceolate .... *Agropyron* 42.
  - Plants annual; glumes ovate.......................... *Triticum* 41.

Spikelets more than one at each rachis joint.
  Spikelets three at each joint, each 1-flowered; lateral pair of spikelets reduced and sterile.................... *Hordeum* 43.
  Spikelets 2 at each joint, each 2-several-flowered.
    Spikes dense, the spikelets ascending; glumes about as long as the florets........................... *Elymus* 44.
    Spikes very loose, the spikelets horizontally spreading at maturity; glumes minute..................... *Hystrix* 45.

1. ANDROPOGON L. Beard Grass

Tufted perennials usually at least a meter tall; inflorescence of spike-like racemes occurring singly or digitately aggregated; spikelets in pairs, one sessile and perfect, the other pedicellate and staminate, sterile or rudimentary; rachis of the inflorescence articulate; sessile spikelets awned.

Racemes single on long peduncles, slender; pedicellate spikelets usually much reduced........................ *A. scoparius* 1.
Racemes 2 or more, nearly digitate, stout; pedicellate spikelets about the same size as the sterile spikelets....... *A. furcatus* 2.

1. **A. scoparius** Michx. (*Little Bluestem.*) Three varieties, not always separable, have been distinguished as follows:

Inflorescence much-branched........................... var. *polyclados.*
Inflorescence simple.
  Sheaths and usually the blades villous.................. var. *villosissimus.*
  Sheaths and usually the blades glabrous................ var. *frequens.*

Var. **polyclados** Scribn. & Ball.—Open sand dunes and sandy wastes, near the shore of Lake Michigan from Whiting to Gary and probably eastward.

Var. **villosissimus** Kearney.—In sandy ground at Dune Park and probably elsewhere.

Var. **frequens** Hubbard. Very common on the dunes and on sandy wastes and in oak barrens, one of the characteristic grasses of the sandy plains west of Miller, going far to make up the typical red-brown appearance of the autumn landscape.

2. **A. furcatus** Muhl. (*Big Bluestem.*) Usually taller and stouter, often as much as 1.5 m. tall.—In sand, and around drying sloughs, general throughout. Late summer and autumn.

2. SORGHASTRUM Nash. Wood Grass

Inflorescence a panicle composed of many racemes, each reduced to 2-5 joints; a sessile spikelet and the pedicel of an obsolete spikelet at each joint, the spikelets awned; pedicels hairy.

1. **S. nutans** (L.) Nash. (*Indian Grass.*) A stout, tufted perennial 1 m. or more tall, with showy oblong inflorescences; glumes bronze; anthers bright yellow. (*S. avenaceum* Nash; *Chrysopogon nutans* Benth.)—On prairies, sandy plains, dunes, and meadows. Late summer.

3. HOLCUS L.

Inflorescence a panicle composed of many few-jointed racemes; a sessile fertile spikelet and a pedicellate sterile but well-developed spikelet at each joint; sessile spikelets awned or awnless.

1. **H. halepensis** L. (*Johnson Grass*). A perennial with stout rhizome often 1 m. or more tall; pedicellate narrower and less flattened than the sessile spikelets. (*Sorghum* Pers.)—Occasional along railroads; often cultivated and sometimes persisting as a weed. Intr. from Eu. Summer.

4. DIGITARIA Scop. Finger Grass

Low spreading annuals; inflorescence composed of 1-sided, slender, spike-like racemes mostly digitately arranged; first glume small or absent; fertile lemma cartilaginous.

Foliage smooth; spikelets less than 2.5 mm. long, the first glume lacking; fruit dark brown.................... *D. humifusa* 1.

Foliage pilose; spikelets 3 mm. or more long, the first glume minute; fruit gray................................ *D. sanguinalis* 2.

1. **D. humifusa** Presl. (*Crab Grass.*) 1.5-4 dm. tall, branched at base, recumbent; racemes 2-6. (*Syntherisma* Rydb., *S. Ischaemum* Nash.)—A bad lawn weed around towns and along transportation lines. Nat. from Eu. Late summer and autumn.

2. **D. sanguinalis** (L.) Scop. (*Crab Grass.*) Creeping at base; stems 3-12 dm. long; racemes 3-12. (*Syntherisma* Dulac.)—A weed around habitations, farms, roadsides, railroad tracks, etc., nat. from Eu. Late summer and autumn.

5. LEPTOLOMA Chase. Fall Witch Grass

Inflorescence a diffuse panicle; spikelets as in *Digitaria*, but long-pedicelled on capillary branches.

1. **L. cognatum** (Schultes) Chase. Tufted perennial; leafy at base; culms spreading; panicle as broad as long, breaking away and becoming a tumbleweed. (*Panicum* Schultes; *P. autumnale* Bosc.)—Sand hills and woody dunes, Gary, Miller, and eastward. Late summer and autumn.

6. PASPALUM L.

Inflorescence of 1 or more slender, spike-like racemes; spikelets plano-convex, the first glume absent; fertile lemma papery, the margins inrolled.

Axillary racemes wholly or partly included in the sheaths; blades puberulent, with long hairs intermixed........ *P. stramineum* 1.

Axillary racemes long-exserted; blades pilose............... *P. pubescens* 2.

1. **P. stramineum** Nash. A yellow perennial, the culms spreading, averaging about 5 dm. long; blades 1 cm. or more wide; inflorescence

usually of 2 terminal racemes and 1 axillary in each sheath; spikelets in pairs, 2 mm. long.—Occasional in dry sand, Miller, and perhaps elsewhere. Probably adv. from West. Summer.

2. **P. pubescens** Muhl. Similar to the preceding, olive green; blades mostly less than 1 cm. wide; axillary racemes usually from upper sheaths only.—In the "commons" of southeast part of Michigan City. Perhaps not native. Late summer and autumn.

7. PANICUM L. Panic Grass

Inflorescence a panicle in all our species; spikelets with one perfect floret and a sterile lemma below; first glume usually much shorter than the second, the second about the same length and similar to the sterile lemma; fertile lemma and palea chartaceous, indurated, the lemma margins inrolled.

Plants annual, flowers in the summer and autumn.

Spikelets 5 mm. long; panicle dense, twice as long as wide, somewhat drooping.......................... *P. miliaceum* 4.

Spikelets usually not over 3.5 mm. long; panicle open, rather loose, not drooping.

Spikelets 2 mm. long, the second glume and sterile lemma conspicuously warty........................ *P. verrucosum* 1.

Spikelets 2.5 mm. long or more, the second glume and sterile lemmas not warty.

Plants smooth; the first glume about ¼ the length of the spikelet, with broad triangular tip........... *P. dichotomiflorum* 5.

Plants more or less papillose-hispid; the first glume ⅓-½ the length of the spikelet, with acute tip.

Panicle about as wide as high; spikelets about 2.5 mm. long, on pedicels mostly scarcely longer than the spikelets...................... *P. capillare* 2.

Panicle ½ as wide as high; spikelets 3 mm. or more long, on pedicels 2 or more times as long as spikelets.............................. *P. flexile* 3.

Plants perennial, often (except in *P. virgatum* and *P. agrostoides*) flowering from spring to autumn.

Plants stout, not branching extensively after first flowering; blades elongated, no basal rosette of short broad leaves.

Rhizomes present; panicle open, spikelets not crowded, usually 4-5 mm. long....................... *P. virgatum* 6.

Rhizomes absent; panicle open but the spikelets crowded, not over 2 mm. long......................... *P. agrostoides* 7.

Plants mostly rather slender and low, usually branching extensively after the first inflorescences are formed in the spring; blades (except in *P. depauperatum*) less than 20 times as long as wide, a more or less distinct rosette of short broad basal leaves formed in autumn and persisting in the following spring.

Blades over 20 times as long as broad, the basal rosettes not distinct; autumn inflorescences very small and almost concealed at the base of the plant, the plant in autumn appearing much the same as in spring.

Spikelets pointed, about 3.5 mm. long.............. *P. depauperatum* 8.

Spikelets blunt, not over 3 mm. long .... *P. perlongum* 9.

- Blades less than 20 times as long as broad, the basal rosettes distinct; autumn inflorescences usually conspicuous, the plant much branched and appearing very different from the spring phase.
  - Spikelets 2.7-3.7 mm. long.
    - Spikelets more or less turgid and strongly nerved, about 3.5 mm. long; blades mostly not over 1 cm. broad, not cordate.
      - Spikelets less than 2 mm. wide; blades mostly less than 1 cm. wide; pubescence appressed... *P. oligosanthes* 31.
      - Spikelets more than 2 mm. wide; blades averaging about 1 cm. wide; pubescence spreading on the lower culm and sheaths.......... *P. Scribnerianum* 32.
    - Spikelets not conspicuously turgid, 2.6-3.7 mm. long, the nerves distinct but not conspicuously so; blades mostly 2-3 cm. wide, cordate at base.
      - Sheaths papillose-hispid...................... *P. clandestinum* 33.
      - Sheaths smooth or softly pubescent........... *P. latifolium* 34.
  - Spikelets not over 2.6 mm. long, mostly less than 2.5 mm. long.
    - Bases of blades conspicuously cordate, the blades often 1 cm. or more wide.
      - Spikelets less than 2 mm. long, nearly spherical................................. *P. sphaerocarpon* 29.
      - Spikelets 2.4-2.6 mm. long, elliptical........... *P. Ashei* 30.
    - Bases of blades not cordate or inconspicuously so, the blades mostly less than 1 cm. broad.
      - Sheaths, blades, and culms usually smooth; lower culms and sheaths sometimes loosely pubescent in *P. Lindheimeri*.
        - Spikelets smooth.
          - Culms soon vine-like and sprawling...... *P. lucidum* 12.
          - Culms branching extensively and sometimes becoming top-heavy but not vine-like.
            - Lower nodes smooth; culms becoming much-branched, upright like a little tree; tip of fruit exposed at maturity..................... *P. dichotomum* 10.
            - Lower nodes usually somewhat bearded; culms becoming much-branched and top-heavy; tip of fruit covered at maturity........... *P. barbulatum* 11.
        - Spikelets pubescent.
          - Spikelets 2-2.2 mm. long.................. *P. boreale* 13.
          - Spikelets 1.4-1.6 mm. long.
            - Inflorescence 2-4 times as long as broad... *P. spretum* 15.
            - Inflorescence less than twice as long as broad........................ *P. Lindheimeri* 16.
      - Sheaths and usually the blades and culms conspicuously pubescent.
        - Ligule usually not over 1 mm. long; blades nearly smooth.
          - Spikelets 2-2.2 mm. long.................. *P. Addisonii* 14.
          - Spikelets 1.8-1.9 mm. long................ *P. tsugetorum* 28.
        - Ligule dense and 1-3 mm. or more long; blades usually pubescent at least beneath.
          - Spikelets 2.2-2.5 mm. long.

  - Culms with horizontally spreading pubescence; autumnal form freely branched........................ *P. villosissimum* 26.
  - Culms with ascending or appressed pubescence; autumnal form sparsely branched.
    - Pubescence sparse, stiff and ascending.. *P. scoparioides* 25.
    - Pubescence copious, silky and appressed. *P. pseudopubescens* 27.
- Spikelets not over 2 mm. long.
  - Spikelets 1.5 mm. long; plants densely pubescent.
    - Plants velvety-pubescent.............. *P. auburne* 23.
    - Plants densely pubescent but not velvety.
      - Panicle axis spreading-pilose, the lower branches somewhat flexuous and tangled................. *P. implicatum* 19.
      - Panicle axis smooth or appressed-pubescent, the lower branches not flexuous and tangled.
        - Panicle axis usually appressed-pubescent; plants spreading in autumn................... *P. albemarlense* 18.
        - Panicle axis usually smooth; plants rather stiffly upright in autumn................... *P. meridionale* 20.
  - Spikelets 1.6-1.9 mm. long; plants conspicuously but not densely pubescent.
    - Blades nearly smooth above, stiff...... *P. tennesseense* 22.
    - Blades more or less pubescent above.
      - Spikelets 1.6-1.8 mm. long; blades short-pilose above or with a few long hairs near the base.
        - Blades stiff, ascending............ *P. huachucae* 17.
        - Blades lax, spreading............. *P. huachucae* var. *silvicola*.
      - Spikelets 1.8-1.9 mm. long; blades long-pilose above, firm and ascending.
        - Plants not branching before the first inflorescences are expanded; culms pilose with ascending hairs............ *P. subvillosum* 21.
        - Plants branching very early, the culms pilose with long, spreading hairs............ *P. praecocius* 24.

1. **P. verrucosum** Muhl. Annual, slender, usually 5 dm. tall or less, the foliage scanty; panicle few-flowered and open; pedicels about the same length as the spikelets; second glume and sterile lemma warty.—Moist sandy soil throughout. Late summer.

2. **P. capillare** L. (*Old Witch Grass.*) Annual, low and somewhat spreading, papillose-hispid; panicle very large and spreading, as wide as long, breaking off at maturity, becoming a tumbleweed.—Frequent in sandy fields and vacant city lots. Late summer and autumn.

3. **P. flexile** (Gattinger) Scribner. Annual, usually 5 dm. tall or less, somewhat papillose-hispid; inflorescence large, half as wide as long.—Moist shady soil along the Grand Calumet. Late summer and autumn.

4. **P. miliaceum** L. (*European, Hog,* or *Broomcorn Millet.*) Annual, not over 5 dm. tall; sheaths papillose-hispid; inflorescence twice as long as wide, somewhat drooping; spikelets crowded.—Cult. and intr. from Eu., escaped to waste places frequently throughout. Summer.

5. **P. dichotomiflorum** Michx. Annual, low and spreading or tall and stout, smooth, the blades often 1 cm. or more wide; panicle large and open. —In low waste ground and cultivated fields, Gary, Clarke, etc. Summer and autumn.

6. **P. virgatum** L. (*Switch Grass.*) Perennial, often 1 m. or more tall, tufted from stout rhizomes; panicle broad and open, the pedicels shorter than the spikelets but the spikelets not crowded. —Common in sandy fields throughout. Late summer.

7. **P. agrostoides** Spreng. Perennial, tufted, as much as 1 m. tall; sheaths strongly flattened; spikelets crowded in an open panicle. —Wet meadows and on shores of ponds, Miller and westward. Summer.

8. **P. depauperatum** Muhl. Nearly smooth, 2-4 dm. tall; panicle small, the spikelets 3.5 mm. long, pointed.—Sand hills, general near Lake Michigan. Spring to autumn.

9. **P. perlongum** Nash. Similar to the preceding; foliage finer and more pubescent; panicle narrower.—Sandy wooded ridge east of East Gary. Spring to autumn.

10. **P. dichotomum** L. Smooth, not over 5 dm. tall; spikelets 2 mm. long; much branched in autumn, like a little tree.—In rich woods. The whole plant is sometimes purplish. Spring to autumn.

11. **P. barbulatum** Michx. Culms sometimes as much as 8 dm. tall, the lower nodes usually somewhat bearded; autumnal form top-heavy and reclining; spikelets as in the preceding, but the fruit not exposed at maturity as in that species.—Woods, Miller, Dune Park and probably elsewhere. Spring to autumn.

12. **P. lucidum** Ashe. Smooth; the culms soon long, vine-like and sprawling.—Wet woods, sphagnum bogs, Dune Park, perhaps elsewhere. Spring to autumn.

13. **P. boreale** Nash. Smooth, not over 5 dm. tall; spikelets pubescent. —Moist open ground, Gibson, Griffith, Miller. Spring to autumn.

14. **P. Addisonii** Nash. Culms 3-4 dm. tall, densely long-spreading-pubescent; sheaths more or less pubescent, the blades smooth above, 4-6 mm. broad; ligule short; spikelets pubescent, about 2 mm. long.—Sloughs, ponds, borders of ponds and on wooded dunes, Tremont. Spring to autumn.

15. **P. spretum** Schultes. Smooth, not over 1 m. tall; inflorescence 2-4 times as long as wide; spikelets 1.5 mm. long.—Sandy soil, high dunes from Miller eastward. Spring to autumn.

16. **P. Lindheimeri** Nash. Resembling the preceding, but the inflorescence less than twice as long as broad, the culms in autumn often prostrate and sometimes as much as 1 m. long. Spring to autumn.

17. **P. huachucae** Ashe. Culms 2-6 dm. tall, stiff and upright; culms and sheaths rather densely papillose-pubescent, the nodes somewhat bearded; blades densely pubescent beneath, pilose above, stiff and ascending; panicle axis often pilose.—Moist or dry sand along woods, borders of sloughs, etc. Spring to autumn.

Var. **silvicola** Hitchc. & Chase. Less stiff, the blades lax and spreading, sparsely pilose above.—Sandy woods, Clarke, tamarack swamp, Mineral Springs and elsewhere. Spring to autumn.

18. **P. albemarlense** Ashe. Densely pubescent, the culms 3-4 dm. tall; blades somewhat velvety beneath.—Sandy woods, Dune Park. Spring to autumn.

19. **P. implicatum** Scribn. Conspicuously pubescent but less so than *P. albemarlense*, usually not over 5 dm. tall, pilose; panicle rather large, the lower branches tangled.—Sandy thicket, Dune Park. Spring to autumn.

20. **P. meridionale** Ashe. Less pubescent and more stiffly upright than *P. albemarlense*, not over 4 dm. tall; panicle axis usually smooth. —Sandy thickets, Porter Co. Spring to autumn.

21. **P. subvillosum** Ashe. Culms not over 4 dm. tall; blades ascending, densely pilose; spikelets 1.8 mm. long.—In dry woods and sandy ground. Clarke, and eastward. Spring to autumn.

22. **P. tennesseense** Ashe. Plant often purple-tinged, usually not over 5 dm. tall; blades ascending, rather stiff and nearly smooth above. —In damp sand, Clarke and Indiana Harbor. Spring to autumn.

23. **P. auburne** Ashe. Light gray-green, velvety-pubescent, not over 5 dm. tall.—In moist sandy woods, Dune Park and possibly elsewhere. Spring to autumn.

24. **P. praecocius** Hitchc. & Chase. Culms slender and geniculate below, branching very early, 4 dm. or less high.—On dry prairies, Hessville to Dune Park. Spring to autumn.

25. **P. scoparioides** Ashe. Culms stout and erect, 3-5 dm. tall; blades as much as 1 cm. broad.—In dry gravelly soil. Spring to autumn.

26. **P. villosissimum** Nash. Culms slender, 2-5 dm. tall; blades often 1 cm. broad, long appressed-pilose above and beneath; sheaths and culms villous with long spreading hairs.—Dry woods and dunes. Spring to autumn.

27. **P. pseudopubescens** Nash. Culms 2-4 dm. tall; nodes bearded; culms and sheaths with silky appressed pubescence; blades mostly smooth in the center above, sparsely pilose near the edges.— Sandy soil, dunes, etc. Spring to autumn.

28. **P. tsugetorum** Nash. Culms 5 dm. or less tall; blades nearly smooth, stiff and ascending, white-margined; lower sheaths and culms appressed-pubescent.—A pretty grass frequent in dry woods and on dunes. Spring to autumn.

29. **P. sphaerocarpon** Ell. Culms spreading at the base, 5 dm. or less tall; blades cordate and ciliate at base, as much as 1.5 cm. broad; panicles about as wide as long, the spikelets nearly spherical.—In wet sand, Dune Park and probably elsewhere. Spring to autumn.

30. **P. Ashei** Pearson. Plant often purplish, 5 dm. or less tall; culms minutely puberulent; blades cordate and somewhat ciliate at the base. (*P. umbrosum* LeConte.)—Along State Line Creek. Spring to autumn.

31. **P. oligosanthes** Schultes. Culms 3-8 cm. tall; sheaths appressed papillose-pubescent; blades mostly less than 1 cm. wide.—In sandy soil, Porter Co. Spring to autumn.

32. **P. Scribnerianum** Nash. Similar to the preceding; sheaths papillose-hispid.—Sandy soils throughout.

33. **P. clandestinum** L. Plants often 1 m. tall; blades 2-3 cm. broad; sheaths papillose-hispid.—In wet ground from Keiser eastward, also East Chicago. Spring to autumn.

34. **P. latifolium** L. Like the preceding but sheaths smooth or softly pubescent.—In moist sandy thickets, Tremont, Miller and westward. Spring to autumn.

8. ECHINOCHLOA Beauv. Hedgehog Grass

Tall annuals, the inflorescence a panicle composed of short racemes; spikelets awned and bristly with short stiff hairs; margins of fertile lemma inrolled below.

Sheaths smooth; awns usually not over 2 cm. long......... *E. Crus-galli* 1.
Sheaths papillose-pilose; awns usually 2.5 cm. long......... *E. Walteri* 2.

1. **E. Crus-galli** (L.) Beauv. (*Barnyard Grass.*) Intr. from Eu. and common around old or fallow fields, roadsides, towns, rubbish heaps, etc. Summer and autumn.

2. **E. Walteri** (Pursh) Nash. Sandy fields, ditches, shores of Lake Michigan. Half weedy in habit. Summer and autumn.

9. CHAETOCHLOA Scribn. Foxtail Grass

Annuals, usually less than 1 m. tall; inflorescence a dense spike-like bristly panicle, one or more bristles subtending each spikelet, the spikelets falling free at maturity; fertile lemma indurated.

Bristles below each spikelet 5 or more; fruit coarsely and strongly cross-wrinkled.......................... *C. lutescens* 1.
Bristles below each spikelet 1-3; fruit minutely cross-wrinkled to nearly smooth.
  Bristles usually greenish, nearly concealing the spikelets; spikelets 2-2.5 mm. long, falling entire at maturity. *C. viridis* 2.
  Bristles usually yellow or purplish, not concealing the spikelets, these 2.5-3 mm. long; fruit falling from the glumes at maturity.......................... *C. italica* 3.

1. **C. lutescens** (Weigel) Stuntz. (*Foxtail, Pigeon Grass.*) (*Setaria* Hubbard; *S. glauca* Beauv.; *C. glauca* Scribn., not *Panicum glaucum* L.)—Common around fallow fields, roads, and cities. Intr. from Eu. Summer.

2. **C. viridis** (L.) Scribn. (*Green Foxtail, Bottle Grass.*) Inflorescence 3 cm. or more long; bristles green and concealing the spikelets somewhat more than in *C. italica.* (*Setaria* Beauv.)—Clarke and probably elsewhere. Intr. from Eu. Summer.

3. **C. italica** (L.) Scribn. (*Millet, German Millet, Hungarian Grass.*) Inflorescence 2-6 cm. or more long, nodding; bristles yellow or purple. (*Setaria* Beauv.)—Ditches and vacant lots around towns and farms, a handsome cereal intr. from Eu. and escaped cult. Summer.

10. CENCHRUS L. Sand Bur

Spikelets enclosed in a globular, spiny bur composed of coalesced sterile branchlets. Burs in racemes and falling entire.

1. **C. pauciflorus** Benth. Annual, usually not over 3-4 dm. tall, nearly smooth; burs pubescent and not over 1 cm. across. Frequent in sand. In the high dunes probably native; along railroads and in the city streets probably adventive; not found in dune woods except along opened trails. Summer.

11. ZIZANIA L. Indian Rice, Wild Rice

A tall annual without creeping rootstocks, with a large panicle which is pistillate above and staminate below; glumes obsolete, represented in the pistillate spikelets by minute capsules below the lemmas; pistillate lemmas with awn 2-7 cm. long, scabrous at least on the nerves and awn; grain long-cylindrical, black, edible; stamens 6. —Here represented by one species, occurring in its typical form and two varieties.

Pistillate lemmas thin and papery, finely striate, microscopically scabrous over the whole surface; aborted spikelets slender and shriveled, less than 1 mm. thick.........	*Z. aquatica.*
Pistillate lemmas firm and tough, with lustrous, coarsely corrugated surface, scabrous on the margins, at the summit and on the awn, and sometimes along the nerves, otherwise glabrous; aborted spikelets with distinct body 1.5-2 mm. thick.	
Plants 0.7-1.5 m. tall; leaves 4-10 (-14) mm. broad; ligules 3-5 (-10) mm. long; lower pistillate branches with 2-6 spikelets; lower or middle staminate branches with 5-15 spikelets..................................	var. *angustifolia.*
Plants 0.9-3 m. tall; leaves 1-3 cm. broad; ligules 1-1.5 cm. long; lower pistillate branches with 11-30 spikelets; lower or middle staminate branches with (20-) 30-60 spikelets....................................	var. *interior.*

1. **Z. aquatica** L. Plant (0.8-) 1.2-3 m. tall; leaves (0.8-) 1-5 cm. broad; ligules (0.6-) 1-2 (-2.5) cm. long. (*Z. palustris* Hitchc. in Gray's Manual, not L.)—In marshes and open water. Summer. With us perhaps more frequently represented by the two following varieties.

Var. **angustifolia** Hitchc. (*Z. palustris* L., not Hitchc. in Gray's Manual.)—In the Grand Calumet at Miller and eastward in creeks and lakes among the dunes.

Var. **interior** Fassett.—In shallow water, Wolf Lake and the Grand Calumet.

12. LEERSIA Sw. Rice Cut-grass

Inflorescence an open panicle, the spikelets short-pedicellate in close rows; spikelets strongly compressed laterally, 1-flowered, falling entire, the glumes absent.

Panicle few-flowered; branches single at a node............	*L. virginica* 1.
Panicle many-flowered; branches fascicled................	*L. oryzoides* 2.

1. **L. virginica** Willd. Perennial, slender, decumbent; blades flat, rough; panicle very open, the distant branches spikelet-bearing toward the end.—Rich wooded dunes, Porter Co. Summer.

2. **L. oryzoides** (L.) Sw. Perennial, 1 m. or more tall, the blades very rough; panicle open and drooping, the lower branches whorled; spikelets oblong, 5 mm. long. (*Homalocenchrus* Poll.)—Abundant in some wet habitats in the dunes, on the sand plains and along the Grand Calumet. Late summer.

13. PHALARIS L. Canary Grass

Inflorescence a compact panicle; spikelets with 1 perfect floret and 2 sterile lemmas below; glumes longer than the florets.

1. **P. arundinacea** L. Perennial, usually 1 m. or more tall, more or less glaucous, the blades scabrous, 1 cm. broad; inflorescence 5-15 cm. long, the spikelets 5 mm. long.—In wet ground, Pine to Tremont. Forma *picta* (L.) Aschers. & Graebn. (Ribbon Grass) with variegated white leaves is cultivated in our area.

14. HIEROCHLOE R. Br. Vanilla Grass

Inflorescence a panicle; spikelets composed of a perfect floret subtended by 2 staminate florets, slightly larger than the perfect floret; glumes exceeding the florets.

1. **H. odorata** (L.) Wahlenb. (*Seneca Grass.*) A sweet-scented perennial about 5 dm. tall; inflorescence an open panicle; spikelets 4-5 mm. long, the staminate florets unawned. (*Savastana* Scribn.) In meadows, Michigan City; springy banks, Liverpool, occasional. Early summer.

15. MILIUM L. Millet Grass

Inflorescence a loose and open panicle; spikelets about 3 mm. long, the glumes slightly longer than the lemma; lemma indurated, shining, dorsally compressed, awnless, the margins inrolled as in *Panicum*.

1. **M. effusum** L. Perennial, the culms 1 m. or more high; blades often 1.5 cm. wide.—Wet woods and dunes at Keiser, and fields, Griffith.

16. ORYZOPSIS Michx. False Rice Grass

Inflorescence a panicle; lemma indurated and usually pubescent, the awn deciduous, the callus broad and blunt; glumes and the lemma about equal.

Spikelets (excluding awns) 7-8 mm. long; blades flat, 5 mm. or more wide.................................... *O. asperifolia* 1.

Spikelets (excluding awns) about 4 mm. long; blades involute, about 2 mm. wide.............................. *O. pungens* 2.

1. **O. asperifolia** Michx. Perennial, about 5 dm. tall; blades rough; spikelets about 8 mm. long, the lemma whitish, with an awn about 1 cm. long.—Along streams and on wooded hillsides. Early summer.

2. **O. pungens** (Torr.) Hitchc. Slender, wiry, tufted perennial with flexuous involute blades; spikelets about 4 mm. long; lemma pale, the awn 1-4 mm. long.—Sand dunes, shore of Lake Michigan, Tremont. Summer.

17. STIPA L. Feather Grass

Perennials; inflorescence an open or contracted panicle; lemma indurated, terete, with a prominent bent and twisted awn, the callus sharp and strongly bearded; glumes membranaceous and acute or acuminate.

1. **S. spartea** Trin. (*Porcupine Grass.*) 0.5-1.2 dm. tall; culm somewhat stout, simple, with overlapping sheaths; blades tending to be inrolled; branches of the narrow panicle erect; lemma brownish; awn long, rigid, rough.—A conspicuous grass characteristic of the ancient beach ridges of Lake Chicago, also on crests of high dunes. Summer.

18. ARISTIDA L. Triple-awned Grass

Similar to *Stipa*, but having the awn 3-parted and the callus minutely bearded.

Plants annual.

  Awns not over 2 cm. long.

    Inflorescence narrow and rather dense; middle awn 1-1.5 cm. long, recurved, the lateral awns 4-5 mm. long. *A. longespica* 1.

    Inflorescence narrow, few-flowered and loose; middle awn 2 cm. long, not much recurved, the lateral awns ⅔ as long.................................... *A. intermedia* 2.

  Awns 3-6 cm. long.

    Awn column not jointed with the lemma, the awns 4-6 cm. long.................................... *A. oligantha* 3.

Awn column jointed with the lemma, the awns 3-4 cm. long	*A. tuberculosa* 4.
Plants perennial; inflorescence narrow and dense; awns 2.5 cm. long	*A. purpurascens* 5.

1. **A. longespica** Poir. Much branched at base, 5 dm. or less tall. —In sandy soil, Pine. Late summer.

2. **A. intermedia** Scribn. & Ball. Culms 3-7 dm. tall.—In moist sand at Miller and edges of drying sloughs, locally abundant, especially from Dune Park westward.

3. **A. oligantha** Michx. Culms usually not over 5 dm. tall; inflorescence loose and somewhat drooping.—On railroad ballast, Miller; perhaps introduced in our area. Late summer.

4. **A. tuberculosa** Nutt. Culms 5 dm. or less tall, much branched, the nodes swollen; glumes very slender and awned; awn column of the lemma twisted, 10-15 mm. long.—In sandy soil and oak woods. Late summer and autumn.

5. **A. purpurascens** Poir. Tufted perennial, about 5 dm. tall; inflorescence narrow and dense.—One of the common species throughout the area, woods, dunes and sand plains. Late summer.

19. MUHLENBERGIA Schreb.

Our species perennial with stout rhizomes; inflorescence a narrow panicle; lemma 3-5-nerved, acute or slender-awned and usually longer than the glumes.

Inflorescence loose or rather dense; glumes shorter than the floret, unawned.	
Blades spreading at right angles to the culm; inflorescence linear, rather loose.	
Lemmas sharp-pointed, not awned	*M. sobolifera* 1.
Lemmas with an awn 2-5 times as long as the body	*M. tenuiflora* 2.
Blades usually ascending; inflorescence cylindrical or narrowly pyramidal, rather dense.	
Plants upright; inflorescence dense, cylindrical, interrupted	*M. foliosa* 3.
Plants spreading; inflorescence narrow but not dense	*M. mexicana* 4.
Inflorescence densely cylindrical, somewhat interrupted; glumes with stiff awns, longer than the floret	*M. racemosa* 5.

1. **M. sobolifera** (Muhl.) Trin. Culms 4-8 dm. tall; blades divaricately spreading; inflorescence slender; lemma awnless.—Reported from Clarke, dry woods. Late summer.

2. **M. tenuiflora** (Willd.) BSP. Similar to the preceding; blades wider, the loose slender panicle with awned spikelets.—Wooded dunes, Tremont. Summer and autumn.

3. **M. foliosa** (R. & S.) Trin. Culms 6-9 cm. tall; blades ascending; inflorescence narrow but dense, interrupted; lemma awnless. —In dry woods or meadows, Miller to Port Chester. Late summer.

4. **M. mexicana** (L.) Trin. Plants much branched and spreading; inflorescence narrow, loose or rather dense; lemma awnless (awned in var. *commutata* Scribn.).—In low moist meadows and swamps, Miller, Gary.

5. **M. racemosa** (Michx.) BSP. Plant 3-9 dm. tall, branched but little; inflorescence very dense, somewhat resembling, but more interrupted than, the inflorescence of timothy (*Phleum*), bristly with stiff-awned glumes.—In a tamarack bog at Mineral Springs, and edges of a drying slough, Pine. Late summer.

20. BRACHYELYTRUM Beauv.

Perennial, with short rhizomes; inflorescence a narrow, few-flowered panicle; glumes minute and unequal; lemma firm and narrow, long-awned, and with a short callus; rachilla prolonged as a slender bristle.

1. **B. erectum** (Schreb.) Beauv. Culms 1 m. or less tall; blades 1-2 cm. broad, thin and rough; lemma about 1 cm. long.—Moist wooded dunes, Furnessville and Keiser. Summer.

21. HELEOCHLOA Host. False Timothy

Plants spreading; inflorescence a dense spike-like panicle terminal and on short lateral branches; spikelets keeled, the lemma longer than the glumes.

1. **H. schoenoides** (L.) Host. A low annual, the inflorescence resembling a small panicle of timothy (*Phleum*), partly surrounded at the base by the inflated leaf sheath.—On railroad ballast at Clarke. Intr. from Eu. Summer.

22. PHLEUM L. Timothy

Inflorescence a dense spikelike panicle; glumes longer than the floret, about equal, keeled and abruptly short-pointed.

1. **P. pratense** L. Perennial; inflorescence cylindrical; glumes ciliate on the keels.—Common in old fields, city streets and barnyards. Intr. from Eu. for hay and escaped cult. Summer.

23. SPOROBOLUS R. Br. Drop-seed

Annuals or perennials; inflorescence an open or contracted panicle; glumes sometimes as long as the lemma; glumes and lemma awnless, the lemma 1-nerved.

Plants annual, branched below, slender; inflorescence usually enclosed in a leaf sheath, the spikelets 4-5 mm. long..	*S. vaginaeflorus* 1.
Plants perennial, tufted, stiff; early inflorescence open; later inflorescence partly enclosed in a leaf sheath, the spikelets 2.5-3 mm. long..	*S. cryptandrus* 2.

1. **S. vaginaeflorus** (Torr.) Wood. Culms usually not over 5 dm. tall; glumes and lemma acuminate.—Along a railroad track, Gary. Perhaps intr. in our area. Late summer.

2. **S. cryptandrus** (Torr.) Gray. Plants 5-8 dm. tall; mouth of sheath with a dense tuft of white hairs; early inflorescence open with stiffly spreading branches, densely crowded with spikelets.—Sandy fields, occasional throughout. Summer.

24. AGROSTIS L. Bent Grass

Perennials; inflorescence an open panicle; glumes longer than the floret, keeled; lemma awnless in our species.

Rhizomes well developed; panicle many-flowered..........	*A. alba* 1.
Rhizomes absent; panicles loosely flowered.	
Panicles fragile, as broad as long, ½-⅔ the height of the plant..	*A. hyemalis* 2.
Panicles not fragile, pyramidal-oblong, scarcely ⅛ the height of the plant............................	*A. perennans* 3.

1. **A. alba** L. (*Fiorin or White Bent Grass, Red Top.*) Plants 5-10 dm. tall; rhizomes present; ligule 3-5 mm. long; panicle rather dense, with short branches in the lower whorls. (*A. palustris* Hudson.)—Waste places about towns, roadsides, railways; common forage plant intr. from Eu. Summer.

2. **A. hyemalis** (Walt.) BSP. Rhizomes none; culms about 5 dm. tall; inflorescence very loose; spikes clustered near the ends of the long, wiry, very rough branches, the panicle axis and branches breaking up at maturity like fine-drawn glass. (*A. laxiflora* Poir.; *A. scabra* Willd.)—Common on dry sands and along swales; forming hummocks in boggy places. Summer.

3. **A. perennans** (Walt.) Tuckerm. (*Thin Grass.*) Perennial, leafy; blades 3-8 mm. long; panicles pale; spikelets about 3 mm. long. —Low dune woods, Tremont and Tamarack Sta. Autumn.

25. CALAMOVILFA Hack. Dune Grass

Perennial; inflorescence an open panicle; lemma slightly longer than the glumes, awnless, the callus densely bearded.

1. **C. longifolia** (Hook.) Hack. var. **magna** Scribn. & Merr. Plants 1-1.6 m. tall, with rhizomes; branches of the rather loose inflorescence more or less ascending; lower sheaths softly appressed-pubescent; spikelets 6 mm. long, the callus hairs half as long. -Very common all along the shore of Lake Michigan and on dune crests, an important sand binder. The culms are full of water, constituting means of quenching thirst on hot dry tops of dunes. Summer.

26. CALAMAGROSTIS Adans. Blue Joint Grass

Perennials; inflorescence a panicle; glumes longer than the lemma; lemma awned from the back, the awn usually not much longer than the lemma; callus usually densely bearded.

Inflorescence loose and open; blades rather lax............ *C. canadensis* 1.
Inflorescence compact; blades stiff....................... *C. inexpansa* 2.

1. **C. canadensis** (Michx.) Beauv. Culms 8-10 dm. or more high, glaucous; leaves and stems stiff; inflorescence rather narrow but loose, the spikelets 3-4 mm. long; callus hairs nearly as long as the floret. —Very common, swales, swamps, wet meadows, and bogs, a beautiful grass forming extensive stands like little cane-brakes, and cut for forage by local farmers. Early summer.

2. **C. inexpansa** Gray. About the same height as the preceding; inflorescence dense; blades stiff and rough; spikelets about 4 mm. long; callus hairs nearly as long as the florets. (*C. confinis* Gray.)—In swales, Mineral Springs to Miller. Summer.

27. **AMMOPHILA** Host. Marram Grass

Perennial with rhizomes; blades stiff and involute; inflorescence a dense, spikelike panicle; callus and the prolonged rachilla short-bearded; floret slightly shorter than the glumes.

1. **A. breviligulata** Fernald. (*Sea Sand-reed, Psamma or Beach Grass.*) Culms 1 m. or less tall; inflorescence 2-3 cm. thick, as much as 25 cm. long; spikelets 12 mm. long; callus hairs 2.5 mm. long. —An important sand binder, the commonest grass of the middle beaches just out of reach of summer storms all along the coast; differs somewhat from *A. arenaria* of Europe with which it formerly was thought to be identical. Late summer.

28. **CINNA** L. Wood Reed

Tall perennials; inflorescence a large panicle; rachilla jointed below the spikelet which falls entire; glumes and lemma about the same length; lemma very shortly awned just below the tip.

Inflorescence rather dense, the panicle branches ascending; spikelets 5-6 mm. long............................ *C. arundinacea* 1.
Inflorescence open, the panicle branches drooping; spikelets 3-4 mm. long................................. *C. latifolia* 2.

1. **C. arundinacea** L. Tremont, Furnessville. Found only in low rich dune woods and along shady creeks. Late summer.

2. **C. latifolia** (Trev.) Griseb. (*C. pendula* Trin.)—In damp woods, rare, reported from Clarke. Late summer.

29. **SPHENOPHOLIS** Scribn.

Perennials with narrow panicles; spikelets 2-3-flowered, the pedicels jointed below the glumes; upper floret exceeding the unequal glumes, the first narrow, the second broad, usually obovate.

1. **S. pallens** (Spreng.) Scribn. Culms 1 m. or less high, the blades about 5 mm. wide, mostly smooth; spikelets 3-4 mm. long; lemmas glabrous.—Moist woods, prairies, and on dunes at Keiser. Early summer.

30. KOELERIA Pers.

Inflorescence a dense spikelike panicle; spikelets 2-4-flowered, compressed, the glumes scarcely as long as the lower florets.

1. **K. cristata** (L.) Pers. Perennial, 5-6 dm. tall; inflorescence 1 cm. thick, 10 cm. or more long, somewhat lobed, varying in compactness and amount of lobing; culm puberulent below the inflorescence; spikelets 3-4 mm. long, awnless, shining.—Abundant throughout in woods and on dunes, characteristic of oak woods. Summer.

31. AVENA L. Oats

Inflorescence a panicle; spikelets large, 2-several-flowered; glumes papery and usually exceeding the uppermost floret, conspicuously nerved; lemma awned from the back.

1. **A. sativa** L. Annual, often 1 m. tall; panicle open and drooping; glumes as much as 2.5 cm. long; awn often reduced or even absent. —Crop plant escaped cult. around old fields and on ballast along railroads. Summer.

32. DANTHONIA DC. Wild Oat Grass

Inflorescence a panicle; spikelets several-flowered, the rachilla readily disarticulating; glumes papery and mostly exceeding the florets; lemma with a bent and twisted awn from between the teeth of a bifid apex.

1. **D. spicata** (L.) Beauv. Perennial; culms 2-7 cm. tall; basal blades short, in curly tufts especially noticeable in the spring; inflorescence narrow but rather loose; glumes 10-12 mm. long; lemmas 5 mm. long, the teeth triangular. Sandy woods, Dune Park to Tremont. Cleistogenes in the lower sheaths. Early summer.

33. SPARTINA Schreb. Slough Grass

Inflorescence a raceme of several 1-sided spikes; spikelets much flattened and closely overlapping, jointed below the glumes, 1-flowered; glumes keeled, acute or short-awned.

1. **S. Michauxiana** Hitchc. Perennial with long stout rhizomes, 1-2.5 meters tall; blades 5 mm. or more wide and long tapering; inflorescence of several loosely arranged spikes; spikelets 10-12 mm. long, the second glume with an awn 5 mm. long.—Marshy lands and dune swales, frequent. Late summer.

34. PHRAGMITES Adans. Reed

A tall, stout, reedlike perennial with stout rhizomes, broad blades, and large showy panicle; spikelets several-flowered, the rachilla clothed with long silky hairs.

1. **P. communis** Trin. Culms 1-3 m. tall or more; blades 2-3 cm. broad; panicle somewhat drooping, often poorly developed, the dense silky hairs of the rachilla nearly 1 cm. long, giving a silky appearance to the whole inflorescence. (*P. Phragmites* Karst.)—Abundant in Wolf Lake and the Grand Calumet River, rarer eastward in dune creeks. Rhizomes extensively creeping.

35. ERAGROSTIS Host. Love Grass

Annuals or perennials; inflorescence an open or contracted panicle; spikelets few-many-flowered, small; lemmas 3-nerved, usually prominently so, often keeled. Paleas often persistent on the rachilla after the lemmas fall.

- Plants creeping, rooting at the nodes; spikelets mostly more than 20-flowered.................................. *E. hypnoides* 1.
- Plants not creeping (sometimes spreading, forming circular mats); spikelets mostly less than 20-flowered.
  - Inflorescence ¾ the height of the plant, very open.
    - Annual, slender; panicle branches somewhat flexuous; spikelets mostly not over 5-flowered............ *E. capillaris* 2.
    - Perennial, stout; panicle branches stiff; spikelets 8-12-flowered.................................. *E. pectinacea* 6.
  - Inflorescence less than ½ the height of the plant, compact or somewhat open.
    - Spikelets less than 2 mm. broad, usually 6-12-flowered; blades usually not over 2 mm. broad.
      - Spikelets not appressed to the panicle branches, on pedicels often longer than the spikelets; lateral nerves of the lemmas indistinct.............. *E. pilosa* 3.
      - Spikelets appressed to the panicle branches, on pedicels mostly shorter than the spikelets; lateral nerves of the lemmas distinct...................... *E. caroliniana* 4.
    - Spikelets 3 mm. broad, 15-20-flowered; blades 3-4 mm. or more broad.............................. *E. megastachya* 5.

1. **E. hypnoides** (Lam.) BSP. Annual, creeping, the culms geniculate and rooting at the base; spikelets often more than 20-flowered; lemmas 2 mm. long, acuminate, the lateral nerves conspicuous.—In wet sands, Dune Park, and probably elsewhere. Summer.

2. **E. capillaris** (L.) Nees. Annual, upright, slender, usually not over 5 dm. tall, a few long hairs in the mouth of the sheath; panicle oblong, and very open, the branches somewhat flexuous; spikelets 3-4 mm. long, lead-colored.—A tumbleweed, found near our borders and almost certainly found within them. Summer.

3. **E. pilosa** (L.) Beauv. Annual, not over 5 dm. tall; panicle branches somewhat flexuous, a few long hairs in the axils of the lower panicle branches; spikelets usually purplish.—Reported as being common on wooded hillsides and in dune woods but acc. to Deam all specimens referable to the next. Summer.

4. **E. caroliniana** (Spreng.) Scribn. Similar to the preceding, nearly erect or spreading and mat-forming, much branched; panicle open but the spikelets appressed to the panicle branches and on rather stiff pedicels; axils of the panicle branches smooth; spikelets

purplish or dark greenish drab; lateral nerves of the lemma distinct but not conspicuous. (*E. Purshii* Schrad.)—Wooded hillsides and dune woods, common throughout. Summer.

5. **E. megastachya** (Koeler) Link. (*Stink* or *Snake Grass.*) Annual, 2-8 dm. tall, branched at the base, the branches geniculate at the lower nodes; inflorescence oblong and rather dense; spikelets usually drab or purple-tinged; florets half as broad as long, with pitted glands on the keels, the lateral nerves conspicuous. (*E. cilianensis* Link, *E. major* Host.)—A bad-smelling grass adv. from Eu., on railroad ballast. Summer.

6. **E. pectinacea** (Michx.) Nees. (*Purple Love Grass.*) Perennial, tufted, 3-8 dm. tall; lower sheaths silky-pilose, a tuft of silky hairs at the mouth of the sheath; panicle very diffuse, the spikelets mostly on rather long, stiff pedicels, purplish.—Wet sand and hollows among dunes, frequent. Brightly colored in autumn; sometimes becoming a tumbleweed. Late summer.

Var. spectabilis Gray, with sheaths nearly glabrous, also is found.

36. DACTYLIS L. Orchard Grass

Inflorescence a panicle of a few more or less distant, compact fascicles of spikelets; spikelets much compressed and nearly sessile, several-flowered; glumes and lemmas ciliate on the keels; lemmas 5-nerved.

1. **D. glomerata** L. Tufted perennial, 1 m. or more tall; blades rough, 4-8 mm. broad; panicle pyramidal. In grassy lands and roadsides, common near cities; forage grass intr. from Eu. Late spring.

37. POA L. Meadow Grass

Annuals or perennials, with or without rhizomes; blades ending in a boat-shaped point; inflorescence a panicle; spikelets several-flowered, compressed and keeled, awnless; lemmas 5-nerved, often somewhat pubescent on the nerves, or with cobwebby pubescence at the base or both.

- Annual, tufted, sometimes forming mats, usually not over 2-3 dm. tall.. *P. annua* 1.
- Perennial, tufted or not, not forming mats, usually 5-10 dm. tall.
  - Rhizomes present.
    - Plants not tufted, the culms compressed; panicle compact, the branches bearing spikelets along almost their whole length.......................... *P. compressa* 2.
    - Plants tufted, the culms not compressed; panicle not compact, the branches usually not bearing spikelets much below their middle.................. *P. pratensis* 4.
  - Rhizomes none.
    - Sheaths somewhat scabrous; marginal nerves of the lemma smooth; panicle rather compact......... *P. trivialis* 5.
    - Sheaths smooth; marginal nerves of the lemma pubescent; panicle loose.......................... *P. palustris* 3.

1. **P. annua** L. (*Spear Grass.*) Panicle rather dense, pyramidal; keel and marginal nerves of the lemma silky-pubescent, the intermediate nerves distinct; no web at the bases of the florets.—In cultivated and waste ground around the cities. Autumn to early spring.

2. **P. compressa** L. (*Canada Bluegrass, Wire Grass.*) Plants bluish-green, the culms rather sharply 2-edged, usually not over 5 dm. tall; spikelets rather closely grouped from the base of the panicle branchlets; florets oblong, the intermediate nerves of the lemmas inconspicuous, nearly smooth, slightly webbed at the base.—In cultivated and waste ground around cities. Intr. from Eu. Summer.

3. **P. palustris** L. Culms 8-10 dm. or more tall; inflorescence large and loose, 15-20 cm. or more long; lemmas oblong, the keel and marginal nerves pubescent.—Swales and low sandy woods. Summer.

4. **P. pratensis** L. (*June Grass, Kentucky Bluegrass.*) Panicle pyramidal and usually many-flowered, no spikelets on the lower ½ of the branches; marginal nerves and the keel of the lemma strongly pubescent, the intermediate nerves plain, a dense web at the bases of the florets.—In cultivated and waste ground around the cities and farms; intr. from Eu. Late spring and summer.

5. **P. trivialis** L. (*Rough-stalked Meadow Grass.*) Panicle rather densely flowered; intermediate nerves of the lemma conspicuous, only the keel pubescent.—Reported from Clarke but no specimen in Field Museum. Wet meadows and roadsides. Late spring and summer.

38. **GLYCERIA** R. Br. Manna Grass

Perennial marsh plants; inflorescence usually a rather open panicle; spikelets few-several-flowered, the rachilla readily disjointing; lemmas usually obtuse and rounded on the back, with 5-7 strong, non-converging nerves.

Spikelets oval, not much longer than broad, less than 1 cm. long.	
Blades 4-8 mm. broad; spikelets 4-5 mm. wide when expanded; nerves distinct but not raised............	*G. canadensis* 1.
Blades mostly less than 4 mm. broad; spikelets usually not over 4 mm. broad; nerves very distinct and raised..	*G. nervata* 2.
Spikelets oblong, 1 cm. or more long.	
Blades mostly nearly 1 cm. broad; spikelets 1.5-2.5 cm. long, 2-3 mm. broad, the florets 4.5-5 mm. long.........	*G. septentrionalis* 3.
Blades 3-6 mm. broad; spikelets 1 or nearly 2 cm. long, 1-2 mm. broad, the florets 4 mm. long..............	*G. borealis* 4.

1. **G. canadensis** (Michx.) Trin. (*Rattlesnake Grass.*) Culms 1 m. or less tall; panicle open and drooping, as broad as long; spikelets slightly longer than broad. (*Panicularia* Kuntze.)—In sloughs, swales and tamarack bogs, frequent. Early summer.

2. **G. nervata** (Willd.) Trin. (*Fowl Meadow Grass.*) Culms 1 m. or less tall; panicle open and drooping, as broad as long; spikelets often purplish, 3-4 mm. long, about 2 mm. broad. (*Panicularia* Kuntze.)—In woods and swamps. Late spring.

3. **G. septentrionalis** Hitchc. Plants mostly over 1 m. tall, the blades mostly nearly 1 cm. broad. (*Panicularia* Bicknell.)—Swamps, bogs, and swales. Summer.

4. **G. borealis** (Nash) Batchelder. Culms 1 m. or less high; inflorescence oblong, rather loose, but the branches ascending. (*Panicularia* Nash.)—Sloughs, Miller. Summer.

39. FESTUCA L. Fescue Grass

Annuals or perennials; inflorescence a narrow or open panicle; spikelets few-several-flowered; glumes and lemmas narrow and acute; lemmas rounded on the back, sometimes awned from the tip.

- Blades 1-2 mm. broad; inflorescence narrow and rather compact; lemmas awned.
  - Annual, simple or somewhat tufted; blades soft; inflorescence usually linear.......................... *F. octoflora* 1.
  - Perennial, densely tufted; blades firm; inflorescence oblong to ovate.................................... *F. ovina* 2.
- Blades 4-6 mm. broad; inflorescence open and rather few-flowered; lemmas awnless........................ *F. nutans* 3.

1. **F. octoflora** Walt. Slender, usually not over 2-4 dm. tall; inflorescence narrow and compact, of short pedicelled spikelets, 6-flowered or more, the lemmas 3-3.5 mm. long, with an awn 1-3 mm. long. (*F. tenella* Willd.)—On new dunes and in woods or on sandy plains; locally abundant. Late spring.

2. **F. ovina** L. (*Sheep's Fescue.*) Densely tufted, mostly less than 5 dm. tall; leaves mostly basal and usually very short, the blades involute, rough and somewhat curled; spikelets about 5-flowered, the lemmas 4.5-5 mm. long with an awn 2-3 mm. long.—In waste ground in the western part of our area, perhaps nat. from north, where native, by Indians, acc. to Hill, or intr. from Eu. Early summer.

3. **F. nutans** Spreng. Culms often 1 m. tall; inflorescence loose, few-flowered, the branches rather stout; blades thin and flat; spikelets usually 3-4-flowered, awnless, the lemmas 4 mm. long. (*F. obtusa* Spreng.)—Woods south of Tamarack Sta., and probably elsewhere. Early summer.

40. BROMUS. Brome Grass

Annuals or perennials; inflorescence a panicle; spikelets several-flowered; lemmas in our species rounded on the back, minutely 2-toothed at the apex, often with an awn from between the teeth.

- Plants annual; foreign weeds.
  - Lemmas smooth; inflorescence loose and rather few-flowered.
    - Sheaths smooth; florets distant enough at maturity to expose the rachilla, the lemma margins somewhat inrolled.................................... *B. secalinus* 1.
    - Sheaths pubescent; florets usually close enough scarcely to expose the rachilla, the lemma margin not inrolled.. *B. commutatus* 3.

Lemmas pubescent; inflorescence rather compact and many-flowered.

Awns 5 mm. or more long, shorter than the lemmas; panicle dense and upright.................... *B. hordeaceus* 2.

Awns usually 1.5 cm. or more long, longer than the lemmas; panicle loose and drooping................ *B. tectorum* 4.

Plants perennial; natives except no. 9.

Rhizomes none; inflorescence mostly open and with drooping branches; lemmas pubescent.

Lemmas strongly pubescent on the margins only........ *B. ciliatus* 5.

Lemmas pubescent on both margins and back, the pubescence of the margins sometimes longer.

Lemmas conspicuously pubescent, but the pubescence not dense and silky; inflorescence usually 1.5 dm. or more long; blades 0.5-1.5 cm. broad.

Sheaths not overlapping; lemmas often only 5-nerved, their pubescence even all over...... *B. purgans* 6.

Sheaths overlapping; lemmas 7-nerved, more densely pubescent at the base.................... *B. altissimus* 7.

Lemmas with dense and silky pubescence; inflorescence about 1 dm. long; blades 4-8 mm. broad...... *B. Kalmii* 8.

Rhizomes present; inflorescence rather narrow and compact, the branches ascending; lemmas smooth or nearly so.................................... *B. inermis* 9.

1. **B. secalinus** L. (*Cheat, Chess.*) Culms less than 1 m. tall; panicle open and drooping, the spikelets comparatively few; lemmas ovate-lanceolate, ½ as broad as long, abruptly awned, the awns 5 mm. or more long, shorter than the lemmas.—A bad weed, nat. from Eu. Summer.

2. **B. hordeaceus** L. (*Soft Chess.*) Culms mostly less than 5 dm. tall; blades and sheaths soft-pubescent, the blades 2-5 mm. broad; lemmas broadly lanceolate, pubescent.—Waste ground near cities. Nat. from Eu.

3. **B. commutatus** Schrad. Inflorescence loose, resembling that of *B. secalinus*, as does the whole plant; awns 6-10 mm. long, about as long as the lemma.—Railroad ballast. Nat. from Eu. Early summer.

4. **B. tectorum** L. Culms 3-6 dm. tall; sheaths and lemmas pubescent; panicle branches flexuous; lemmas elongate-lanceolate, long-awned.—Handsome but bad weed, railroad ballast. Nat. from Eu. Late spring.

5. **B. ciliatus** L. Often 1 m. or more tall; blades about 1 cm. broad, the blades and sheaths somewhat pubescent; panicle loose and drooping; lemmas lanceolate, about 1 cm. long, pubescent half way up on the margins.—Wet sand, fairly frequent. Summer.

6. **B. purgans** L. Similar to the preceding in habit; blades 0.5-1.5 cm. broad; sheaths not overlapping.—On dunes, rather characteristic of its habitat. Summer.

7. **B. altissimus** Pursh. Similar in habit to the preceding; sheaths overlapping.—In wet ground along creeks, especially of the high dune region. Summer.

8. **B. Kalmii** Gray. Culms not over 1 m. tall; blades 4-8 mm. broad; blades and sheaths villous; spikelets drooping, with 6-10

florets; lemmas densely silky-pubescent, about 1 cm. long, the awns 2-3 mm. long.—In sandy hollows and on dunes. A beautiful species especially characteristic of the pine woods. Early summer.

9. **B. inermis** Leyss. Culms often 1 m. tall; spikelets narrow, 2-3 cm. long; lemmas elongate-lanceolate, usually awnless or very short-awned.—A valuable forage grass nat. from Eu. Railroad ballast. Summer.

41. TRITICUM L. Wheat

Inflorescence a dense, 2-sided spike; spikelets 2-5-flowered and single at each joint of the rachis; glumes and lemmas broad, the glumes mucronate, the lemmas awned or awnless.

1. **T. aestivum** L. Annual, often 1 m. or more tall; blades 1 cm. or more broad; lemmas awnless or with awns as much as 10 cm. or more long. (*T. vulgare* Vill.)—Crop plant occurring on railroad ballast and edges of cultivated fields. Intr. from Eu. Summer.

42. AGROPYRON Gaertn.

Usually perennial, often with rhizomes; inflorescence a 2-sided spike; spikelets several-flowered and single at each rachis joint; glumes and lemmas acute or awned, narrow.

Awns shorter than their lemmas or lacking; rhizomes present.	
Blades stiff and involute; rhizomes slender..............	*A. Smithii* 1.
Blades flat and lax, 4-8 mm. broad; rhizomes stout.......	*A. repens* 2.
Awns as long as and often longer than their lemmas; rhizomes absent................................	*A. caninum* 3.

1. A. Smithii Rydb. (*Blue-joint.*) Culms sometimes 1 m. or more tall; glumes and lemmas acute or short-pointed.—Occasional in low sandy ground in the western part of our area; nat. from West. Early summer.

2. **A. repens** (L.) Beauv. (*Couch, Quitch,* or *Quick Grass.*) Glumes and lemmas awn-pointed, the lemmas sometimes with awns nearly as long as the lemmas.—Railroad ballast and waste sandy ground. A bad weed but a good sand binder. Nat. from Eu. Summer.

3. **A. caninum** (L.) Beauv. Culms up to 1 m. tall; blades 4-8 mm. broad, very rough.—On sandy ridges and in pine woods, frequent. Nat. from Eu. Summer.

43. HORDEUM L. Barley Grass

Inflorescence a dense spike with three spikelets at each rachis joint, the lateral spikelets reduced, sterile; spikelets 1-flowered; glumes placed in front of the spikelets; glumes and lemmas usually conspicuously awned; rachis of inflorescence articulate in our species, continuous in *Hordeum vulgare* L., the common barley which is cultivated in our area and may escape.

Awns 4-5 cm. or more long; glumes of the middle spikelets not dilated.. *H. jubatum* 1.

Awns less than 1 cm. long; glumes of the middle spikelet dilated. .... *H. pusillum* 2.

1. **H. jubatum** L. (*Squirrel-tail Grass.*) Perennial, averaging about 5 dm. tall; inflorescence nodding and somewhat plume-like from the numerous long, silvery awns, several cm. broad.—A graceful plant but a troublesome weed in pastures. Frequent as a native in the prairie area, elsewhere adventive. Summer.

2. **H. pusillum** Nutt. Annual, 1-4 dm. tall; spikes about 8 mm. broad and 4-5 times as long.—Along railroads, adv. from West. Late spring.

44. ELYMUS L. Wild Rye

Inflorescence a dense spike with 2 spikelets at each joint of the rachis, each 2-several-flowered; glumes often in front of the spikelets, narrow, acute or awned; lemmas awned in our species.

Spikes erect; glumes hardened and bowed out at the base; awns usually about 1 cm. long.................... *E. virginicus* 1.

Spikes nodding at least at the tip; glumes not much hardened nor bowed out at the base; awns mostly 1-4 cm. long.

Spikes mostly less than 10 cm. long; awns spreading but not recurved, 1-2 cm. long; glumes awl-shaped, 2-nerved.

Leaves thin, villous above; spikes slender and loose; spikelets 4-flowered.......................... *E. canadensis* 2.

Leaves thicker, tending to be involute when dry, usually glabrous; spike denser; spikelets 2-5-flowered..... *E. robustus* 3.

Spikes mostly less than 10 cm. long; awns spreading but not recurved, 1-2 cm. long; glumes awl-shaped, 2-nerved.

Palea 5.2-6.7 mm. long; rachis-joints 1.5-3 mm. long; spikelets 1- (rarely 2-) flowered; foliage villous... *E. striatus* 4.

Palea 7.5-8 mm. long; rachis-joints 3-4.5 (rarely 5-8) mm. long; spikelets 2-4-flowered; leaves and sheaths glabrous................................ *E. riparius* 5.

1. **E. virginicus** L. Blades broad; spikes erect, scarcely exceeding the leaves; glumes lanceolate and strongly 5-8-nerved.—In rich woods along creeks, and sometimes adventive along railway tracks. Summer.

2. **E. canadensis** L. (*Wild Rye.*) In large clumps, up to 1.5 m. tall; blades broad; spikes nodding, 10-15 cm. or more long; lemmas pubescent, the awns spreading. (*E. glaucifolius* Willd.)—One of the commonest plants of the new dunes, and an important sand-binder. Very handsome on account of its glaucous spikelets and nodding spikes. Summer.

3. **E. robustus** Scribn. & Smith, var. **vestitus** Wiegand. Glaucous; spikes long-exserted, large, stiff, upright but slightly nodding; glumes scabrous; awn long, slender, flexuous.—Dunes, Tremont, probably more widely scattered, as it occurs with *E. canadensis* for which it has in the past often been mistaken. Summer.

4. **E. striatus** Willd. Culms 1 m. or less tall; blades often 1 cm. or more wide; spikes nodding, usually not over 10 cm. long; glumes

and lemmas pubescent.—Low woods by dune creeks, infrequent. Early summer.

5. **E. riparius** Wiegand. Tall; spikes much exserted, slightly nodding, 7-20 cm. long, exclusive of awns; spikelets spreading; glumes roundish; awns long and straight.—Along Dune Creek. Summer.

45. HYSTRIX Moench. Bottle-brush Grass

Inflorescence a very loose spike; spikelets usually 2 at a joint, with 2 or more flowers; glumes minute; lemmas long-awned.

1. **H. patula** Moench. Culms often 1 m. tall; spikelets at maturity horizontally spreading; awns 2-4 cm. long; lemmas 0.5-1.5 cm. long. (*H. Hystrix* Millsp.; *Asperella Hystrix* Humb.)—In low rich woods along dune creeks, rare. Early summer. Our plant has pilose spikelets and has been described as *Asperella Hystrix*, var. *Bigeloviana* Fernald.

SEDGE FAMILY (Cyperaceae)

Text contributed by Dr. Norman C. Fassett

Herbs with 3-sided or rarely rounded or flattened stems (culms) with linear leaves in 3 rows (rarely 2-rowed), their blades mounted on long sheaths which surround the stem; inflorescence generally subtended by 1, 2, or 3 bract leaves; flowers minute, not petaloid, arranged in spikelets somewhat as in grasses, the spikelets usually clustered in a spike-like or panicled inflorescence. The perianth is usually represented by hairs, bristles, or similar developments, often of indefinite number, but in the two largest genera, *Cyperus* and *Carex*, the flowers are naked of any perianth. Flowers wind-pollinated, regular, bisexual or unisexual, subtended and hidden by overlapping scales; stamens 2-3; ovary 1, with 2 or 3 styles and 1 ovule; fruit a lens-shaped or 3-sided achene, with a tough, hard wall.

Sedges for the most part bloom inconspicuously in early summer, and do not become especially noticeable until they fruit, in midsummer or autumn, nor can determination be made satisfactorily in most cases without fruiting material.

The sedges, though resembling the grasses in vegetative habit, differ in having chiefly triangular and solid stems (hollow in *Dulichium*) and closed leaf-sheaths, and in the scales, none of which are regularly empty; there is no palea as in grasses, and the anthers are fixed by the base, instead of by the middle.

While most of the grasses occupy drier habitats, only a few being aquatic, the sedges are chiefly plants of aquatic or moist habitats, only a few being found under dry conditions. In number of species the *Cyperaceae* are second only to the *Compositae* in this region, and as they contain no foreign weeds, while the *Compositae* contain many, they must have been practically the equals of the *Compositae* in the original flora. They have little economic importance, but great technical interest.

Stamens and pistil in the same flower.
Spikelets many-flowered, with 1 (rarely more) empty scale at the base.
Scales of spikelets 2-ranked.
Achene without bristles.......................... *Cyperus* 1.
Achene with bristles............................ *Dulichium* 3.
Scales all around the spikelet.
Achene topped by the bulbous base of the style (the "tubercle").
Spikelet solitary............................ *Eleocharis* 4.
Spikelets several on each culm.
Leaves flat, folded.......................... *Psilocarya* 5.
Leaves thread-like.......................... *Stenophyllus* 6.
Achene without a tubercle, although sometimes with a persistent short tip.
Plants several decimeters tall or if smaller, spikelets spindle-shaped, pointed.
Sheaths not hairy.
Bristles around the achene 0-8, not long and silky.
Plants 1-7 dm. tall, with many spikelets in a much-branched inflorescence.... *Fimbristylis* 7.
Inflorescence simple, or if branched then the plants more than 7 dm. tall.... *Scirpus* 8.
Bristles many, long and silky............. *Eriophorum* 9.
Sheaths hairy.......................... *Fuirena* 10.
Plants 0.2-1.5 dm. tall, with blunt or round-tipped spikelets............................ *Hermicarpha* 11.
Spikelets 1-2-flowered, with 2-many of the lower scales empty.
Heads of spikelets sessile in the involucre........... *Kyllinga* 2.
Heads mostly peduncled.
Achene tipped with a tubercle.................. *Rynchospora* 12.
Achene without a tubercle..................... *Mariscus* 13.
Stamens and pistils generally in different flowers.
Achene not enclosed in a sac (perigynium)............. *Scleria* 14.
Achene enclosed in a perigynium, this sometimes an inflated sac, sometimes merely a closely investing coat..................................... *Carex* 15.

1. CYPERUS L. Galingale

Culms simple, leafy at base; inflorescence of unequal rays, leafy-bracted at base, usually with several spikelets, or spikelets in a dense head; spikelet flat, linear or lanceolate, its scales often brightly colored; stamens 1-3; style 2-3-cleft.

Bases of plants not enlarged to form corms; sometimes with tubers or stolons.
Spikelets oblong, not over 4 times as long as broad, disposed subpalmately in heads; achene lenticular, except in No. 3.
Tips of scales appressed, blunt; plant not with fragrance of slippery elm.
Stamens 2; style-branches conspicuously exserted.... *C. diandrus* 1.

Stamens 3; style-branches seldom exserted.......... *C. rivularis* 2.
Tips of scales recurved, acuminate; plants with fragrance of slippery elm.............................. *C. inflexus* 3.
Spikelets linear, many times as long as broad, disposed pinnately in heads; achenes trigonous.
Spikelets strongly flattened; scales 15 or more, spreading; roots red................................ *C. erythrorhizos* 4.
Spikelets subterete, or if flattened, scales 10 or less; scales strongly ascending.
Scales deciduous; plants bearing tubers............. *C. esculentus* 5.
Scales not deciduous; plants not bearing tubers.
Flowers remote, the successive scales not reaching the bases of the ones above on the same side. *C. Engelmanni* 6.
Flowers approximate, the successive scales overlapping the bases of those above.............. *C. ferax* 7.
Bases of plants enlarged to form hard corms.
Heads open.
Scales closely appressed, so that the linear-acuminate spikelet is 1.5 mm. broad.................... *C. strigosus* 8.
Scales ascending-spreading, so that the oblong spikelet is 3.5 mm. broad.............................. *C. Schweinitzii* 9.
Heads dense.
Heads 5-many, turbinate-obovoid.................... *C. ovularis* 10.
Heads single or few, spherical or hemispherical.
Achene about one-half as broad as long............ *C. filiculmis* 11.
Achene about two-thirds as broad as long........... *C. Houghtonii* 12.

1. **C. diandrus** Torr. Culms 0.5-4 dm. tall; spikelets 0.5-1 cm. long, 2-3 mm. broad; scales usually marked with purple-brown; achene oblong-obovate, the surface with minute rectangular markings.—In quiet shallow water or muddy shores throughout.

2. **C. rivularis** Kunth. Closely similar to the preceding; spikelets longer, with firmer scales.—In wet sand, from Indiana Harbor and Clarke to Miller. Often tinting the margins of ponds brown.

3. **C. inflexus** Muhl. Plants 2-20 cm. tall; lower sheaths reddish; scales about 2.5 mm. long, their tips conspicuously recurved; achene oblong-obovate. (*C. aristatus* Rottb.)—In wet sandy ground, Dune Park and Miller, also Calumet District, acc. to Pepoon.

4. **C. erythrorhizos** Muhl. Stout, 1-8 dm. tall; heads usually 20 or more, oblong, 2-4 cm. long; spikelets with parallel sides, obtuse at tip; scales lanceolate, mucronulate, bright chestnut-colored or gilt; achene ovoid, shining.—Ditches, Clarke and Indiana Harbor.

5. **C. esculentus** L. Stems stout, 3-9 dm. tall; heads oblong; spikelets linear, acute; scales strongly nerved, 2 mm. long, acute, chestnut-brown, dull; achene oblong, minutely roughened.—The only station has long been destroyed by the growth of Indiana Harbor, but the species may occur elsewhere in the dunes.

6. **C. Engelmanni** Steud. Plants 1-8 dm. tall; rays usually short; heads ovoid to oblong; spikelets linear-lanceolate, tapering to a fine point, the axis narrowly winged; scales closely appressed, nerved, 2-2.9 mm. long, acute, yellowish or chestnut-colored; achene linear, 1.8 mm. long.—Wet prairies of the northwestern Calumet District; moist ground near Pine, acc. to Hill.

7. **C. ferax** Richard. Very similar to the preceding; axis of spikelets broadly winged; achene 1.5 mm. long.—Wet prairies of the southwestern Calumet District.

8. **C. strigosus** L. Plants 0.1-1 m. tall; culms thickened at base into a subspherical corm; inflorescence large and spreading; heads ovoid, 2-5 cm. long; spikelets tapering to a long point, 0.7-1.8 cm. long; scales golden yellow, often with a drab midnerve, obtuse, 3-4 mm. long.—Common in wet sandy ground, wet grass, ditches, etc., throughout.

Var. **robustior** Kunth, with spikelets 2-3 cm. long, occurs at Dune Creek and probably elsewhere.

9. **C. Schweinitzii** Torr. Plants 2-8 dm. tall; culms sharply 3-angled, very rough; heads ovoid, some of them sessile; spikelets 1-1.5 cm. long, pinnately clustered in the heads, ascending; scales 3.5-4.5 mm. long, strongly nerved, slightly mucronate; achenes 3 mm. long. —Sandy hollows, Pine and Roby to Michigan City and eastward.

10. **C. ovularis** (Michx.) Torr. Plants 2.5-7 dm. tall; spikelets 3-flowered, 3-5 mm. long, the lower reflexed; scales ovate, obtuse, strongly nerved; achene linear, 1.3 mm. long.—Rare in sandy fields near East Chicago, acc. to E. J. Hill, who notes specimens with spikelets 2-flowered.

11. **C. filiculmis** Vahl. Plants slender, wiry, 1.5-6 dm. tall; leaves about one-half as long as the culm, narrow; involucral bracts spreading; spikelets 1-1.6 cm. long, the lower reflexed; scales 2.5 mm. long, blunt, yellowish-green.—In dry, sterile or open sand dunes, throughout, at least north of the Little Calumet.—Var. *macilentus* Fernald. Spikelets 3-8 mm. long; scales greenish.—Dune Park, acc. to Umbach.

12. **C. Houghtonii** Torr. Similar to the preceding; heads hemispherical, the lower spikelets not diverging.—In dry sand, Dune Park and Miller.

2. KYLLINGA Rottb.

Culms leafy at base; inflorescence of 1-3 close globular heads; involucre 3-leaved; stamens 2; styles 2; achene lenticular.

1. **K. pumila** Michx. Culms 0.5-3 dm. tall.—Moist sandy soil, Miller and Dune Park, acc. to Pepoon.

3. DULICHIUM Pers.

Culms leafy, terete, hollow, from stout rootstocks; leaves 3-ranked, with inflated sheaths, the lower bladeless, the upper grading into large bracts; inflorescence of linear flattened spikes, sessile on peduncles which emerge from the sheaths; stamens 3; style 2-cleft; bristles 6-9, downwardly barbed; achene beaked with the long persistent style.

1. **D. arundinaceum** (L.) Britton. Culms 2-10 dm. tall.—Abundant in wet ground from Wolf Lake and Gibson to Mud Lake, but not south of the Little Calumet or east of Mineral Springs, since it appears

to be absent from Dune Creek and Trail Creek. Where it occurs this species of curious habit often forms a distinct zone of marginal vegetation around muddy sloughs.

4. ELEOCHARIS R. Br. Spike Rush

Culms generally leafless, with 1-several sheaths at base; scales of the spikelet overlapping in many rows; style 2-3-cleft, its base persisting as a jointed tubercle capping the achene. Bristles 4-8, rarely none, usually 6.

Scales persistent; spikelets hardly thicker than the culm.	
Spikelets many-flowered, with thick, faintly nerved scales.	
Culms terete, with cross-partitions..................	*E. interstincta* 1.
Culms quadrangular, continuous....................	*E. quadrangulata* 2.
Spikelets few-flowered, with herbaceous, distinctly nerved scales....................................	*E. Robbinsii* 3.
Scales deciduous; spikelets usually much thicker than the culm.	
Achenes lenticular or biconvex; styles mostly 2-cleft.	
Plants tufted, without conspicuous rootstocks.	
Upper sheaths loose, with white, scarious tips.......	*E. olivacea* 4.
Upper sheaths close and firm, the tips often dark-margined.	
Tubercle one-half as broad as the achene or narrower.	
Tubercle saucer-shaped	*E. caribaea* 5.
Tubercle conical............................	*E. ovata* 6.
Tubercle nearly or quite as broad as the achene....	*E. obtusa* 7.
Plants from elongate rootstocks, not tufted...........	*E. palustris* 8.
Achenes trigonous; styles 3-cleft.	
Achene glossy; tubercle broader than the achene	*E. melanocarpa* 9.
Achene reticulate or roughened; tubercle not more than half as broad as the achene or narrower.	
Achene reticulate; culms becoming elongated when submerged.............................	*E. acicularis* 10.
Achene sometimes papillose-roughened, but not reticulate.	
Culms 4-angled..............................	*E. capitata* 11.
Culms flattened.............................	*E. acuminata* 12.

1. **E. interstincta** (L.) R. & S. Perennial from stout rootstocks which sometimes bear tubers; culms 0.5-1 m. tall, 5-7 mm. thick, hollow; spikelets 2-4 cm. long; scales about 5 mm. long, light brown with darker margins; achenes 1.5-2 mm. long. (*E. equisetoides* Ell.) – A curious coastal plain species, superficially resembling a horsetail. (*Equisetum.*)—Rare, in Wolf Lake and eastward in ponds among the dunes.

2. **E. quadrangulata** (Michx.) R. & S. Similar to the preceding in habit; culms 4-6 mm. thick, sharply 3-4-angled, continuous; spikelets 2-6 cm. long; scales as in preceding; achenes biconvex or slightly angled on the back; tubercle acute. (*E. mutata* Britton, not R. & S.) —Rare, in Wolf Lake. A coastal plain species.

3. **E. Robbinsii** Oakes. Perennial, often producing floating thread-like culms; fruiting culms 1.5-6 dm. tall, 1-1.5 mm. thick; spikelets

1-2.5 cm. long, very sharp; scales light brown, lanceolate; achenes light brown, about 3 mm. long, tapering at base, finely reticulate with cross-lines; tubercle darker than the achene, long-pointed.—Rare in shallow water, Dune Park. Mrs. Chase notes that it is perennial by slender red rootstocks which terminate in pink underground buds, especially on plants bearing no fruit.

4. **E. olivacea** Torr. Perennial by slender rootstocks; culms often tufted, flattish, 2-15 cm. tall, 0.5 mm. thick; spikelets 3-7 mm. long, oblong-ovoid, acute, 20-30-flowered; scales 2-3 mm. long, acute, reddish-brown, with green midribs; achenes light to dark brown; tubercle about one quarter as broad as the achene, long-pointed, narrowed at base.—In wet sandy ground, around the edge of Wolf Lake, and east to Dune Park.

5. **E. caribaea** (Rottb.) Blake, var. **dispar** (E. J. Hill) Blake. Annual with slender culms 5-25 cm. tall; spikelets 3-5 cm. long, ovoid to cylindrical, 15-40-flowered; scales ovate, purple-brown; achenes obovoid, purple-black. (*E. capitata* R. Br. var. *dispar* Fernald.)—An endemic offshoot of a coastal plain species confined wholly to a few lagoons at Pine, and marshy borders of Wolf Lake. E. J. Hill notes that the stamens are often only 2.

6. **E. ovata** (Rottb.) R. & S. Annual; culms about 1 mm. thick, 0.5-4 dm. tall; lower sheaths often reddish; spikelets 2-4 mm. long, globose-ovoid to cylindric; scales about 1 mm. long, obtuse, red-brown with green midribs and scarious margins; achenes light brown.—In wet sand, Dune Park and Miller. Mrs. Chase notes that the spikes taper toward the top but that the bristles are longer than the achenes.

7. **E. obtusa** (Willd.) Schultes. Similar to the preceding; culms 0.5-7 dm. tall, 0.5-2 mm. thick; lower sheaths often reddish; spikelets 2-13 mm. long, globose-ovoid to ovoid-oblong; scales about 1.5 mm. long, very blunt, dull reddish-brown, often with greenish midrib; achenes light brown.—Very common in muddy or wet places, especially along lakes and streams of the high dune country.

8. **E. palustris** (L.) R. & S. Culms 0.1-1.5 m. tall, 1-3 mm. thick; lower sheaths reddish; spikelets 4-13 mm. long, subcylindric, tapering, sharp-pointed; scales acute, light- to reddish-brown, often with green or light-brown keel; achenes obovoid, turgid, shining, with a conical tubercle, which is rounded at base.—In shallow water, range of the preceding.

Var. **glaucescens** (Willd.) Gray. Culms very slender; tubercle longer.—In shallow water, Miller to Dune Creek.

9. **E. melanocarpa** Torr. Culms flattened, 2.5-7 dm. tall, about 1 mm. thick; upper sheaths somewhat reddish, squarely truncate, with mucronate tips, dark-margined; spikelets 7-15 mm. long, ovoid, blunt-tipped; scales obtuse, brownish, with scarious tips; achenes about 0.7 mm. long, obtusely triangular.—In dune meadows, Dune Park to Mineral Springs. Culms proliferous at the tip (acc. to E. J. Hill); growing in dense tufts with thickened-fibrous roots (acc. to Mrs. Chase). A coastal plain species.

10. **E. acicularis** (L.) R. & S. Often matted; culms thread-like, 3-10 cm. tall, except in elongated, submerged individuals; spikelets 2-6 mm. long, often sterile; scales acute, light green, with purple edges; achene about 0.8 mm. long, with small conical tubercle.—Very common in and around rain-fed sloughs, Gibson to Tremont. Often wholly sterile, and even when fruitful the inflorescence so minute and delicate as to be easily overlooked. This plant is one of the smallest and most delicate of our sedges.

11. **E. capitata** (L.) R. Br. Culm 0.5-5 dm. tall, 0.5-1.5 mm. thick, from dark rootstocks; sheaths green or reddish, truncate and dark-margined at tip; spikelets ellipsoidal, acute or rounded, 3-10 mm. long; scales rounded at tip, dark red, with green midrib and light scarious margins; achene 1-1.3 mm. long, with small depressed tubercle. (*E. tenuis* Schultes.)—In sloughs and wet sand, Roby to Griffith. Our specimens tend to have large spikes and bright orange achenes.

12. **E. acuminata** (Muhl.) Nees. Rootstock 3-4 mm. thick, with coarser scales than in the preceding, which it generally resembles in culms, sheaths, and spikelets.—In wet ground, northwestern Calumet District, acc. to Gates and H. & R.

13. **E. intermedia** (Muhl.) Schultes. Culms 0.2-4 dm. long, tufted, slender, spreading or reclining; spikelets 2-7 mm. long, 5-20-flowered; scales purplish-brown, with green keels; tubercle awl-shaped.—Low wet ground, throughout.

5. PSILOCARYA Torr. Bald Rush

Culms slender, leafy; spikelets in terminal and axillary cymes; stamens 2; style 2-cleft. Our species inconspicuous annuals with slender culms.

Achene finely roughened..............................	*P. scirpoides* 1.
Achene transversely ribbed..............................	*P. nitens* 2.

1. **P. scirpoides** Torr. Plants 0.2-3 dm. tall; culms and leaves smooth; achene smooth or slightly wrinkled, shorter than the beak.—Sloughs and bogs, Dune Park and Mud Lake.

2. **P. nitens** (Vahl) Wood. Plants taller, 5-7 dm. high; achene deeply wrinkled, shorter than the beak.—Range of the preceding.

6. STENOPHYLLUS Raf.

Leaves mostly basal, much shorter than the slender culms; spikelets in panicled close umbels; stamens 2.

1. **S. capillaris** (L.) Britton. Plants densely tufted; culms 0.3-3 dm. tall; leaves minutely ciliate; achene acutely triangular, blunt, minutely wrinkled.—Dry, sandy fields, frequent.

7. FIMBRISTYLIS Vahl.

Spikelets terete, umbelled; involucre 2-3-leaved; stamens 1-3; style 2-3-cleft. Our species chiefly low-growing, the involucral bracts relatively inconspicuous.

Plants perennial from rootstocks, tall, 1.5-7 dm. high; spikelets ovoid, 3-4 mm. thick	*F. castanea* 1.
Plants annual, tufted with fibrous roots, 1-4 dm. tall; spikelets cylindric to spindle-shaped, 1-1.5 mm. thick.	
Umbel compound or decompound; achene smooth or slightly roughened	*F. mucronata* 2.
Umbel simple or slightly compound; achene minutely reticulate (under the microscope)	*F. autumnalis* 3.

1. **F. castanea** (Michx.) Vahl. Culms slender and wiry, scabrous above; leaves crowded at base, inrolled, somewhat wavy and twisted, shorter than the culm; spikelets single, chestnut-brown; scales, at least the lower, puberulent; achene lenticular, ovoid, 1.3 mm. long. —Clarke to Dune Park, in moist sand. In the East a salt-marsh species.

2. **F. mucronata** (Michx.) Blake. Culms smooth, capillary or reaching 1.5 mm. in diameter; leaves flat or involute, shorter than the culm; umbel diffuse, reaching 7 cm. in length; rays wavy; scales of the spikelets appressed; achene 0.5 mm. long. (*F. autumnalis* of Gray's Manual.)—Wet sand, Dune Park to Mud Lake and Dune Creek.

3. **F. autumnalis** (L.) R. & S. Smaller; umbels 1-3 cm. long; scales of spikelets slightly spreading at tip; achenes 0.75 mm. long. (*F. Frankii* Steud., of Gray's Manual; *F. geminata* Kunth.)—Rare in sloughs, Miller to Tamarack Sta.

8. SCIRPUS L. Bulrush

Perianth of 8 or fewer bristles, or none; stamens 2-3; style 2-3-cleft, either falling entire or else leaving a short tip on the achene. Annuals or perennials of various habits and statures; the first four are low-growing, with inconspicuous inflorescences; the others are the typical big bulrushes; the last two are distinguished by conspicuous woolly panicles when mature.

Involucre none, or merely the continuation of the culm, not leafy.	
Culms not thick and spongy, or, if so, sharply 3-angled.	
Involucre none	*S. pauciflorus* 1.
Involucre present.	
Culms tufted, seldom exceeding 2 mm. in thickness.	
Spikelets solitary; achene triangular	*S. subterminalis* 2.
Spikelets usually in threes; achenes lenticular.	
Achene unequally biconvex	*S. debilis* 3.
Achenes convex on one side, flattened on the other	*S. Smithii* 4.
Culms solitary from running rootstocks.	
Achene convex on one side, flat on the other; involucral leaf pointed	*S. americanus* 5.

Achene trigonous; involucral leaf blunt........... *S. Torreyi* 6.
Culms thick and spongy, subterete.
Achenes 2 mm. long, nearly equalling the scales....... *S. validus* 7.
Achenes 2.5-3 mm. long, much exceeded by the scales.. *S. acutus* 8.
Involucral bracts 2 or more, leafy.
Spikelets 1-2 cm. long, 0.5-1 cm. thick.................. *S. fluviatilis* 9.
Spikelets 7 mm. or less long, about 2 mm. thick.
Spikelets oblong, cylindrical at maturity.............. *S. lineatus* 10.
Spikelets ovoid.
Spikelets in glomerules.
Culms mostly solitary; bristles barbed.
Bristles about equalling the achene............. *S. atrovirens* 11.
Bristles twice as long as the achene............. *S. polyphyllus* 12.
Culms in clumps; bristles smooth and much longer than the achenes, giving the spikelets a woolly appearance at maturity.................. *S. cyperinus* 13.
Spikelets mostly pedicelled........................ *S. Eriophorum* 14.

1. **S. pauciflorus** Lightf. Culms 0.5-4 dm. tall, about 0.7 mm. thick, striate; sheaths truncate, reddish-margined; spikelets solitary, 3.5 cm. long; scales reddish-brown, the two lowest a little larger than the others.—Muddy places, Whiting, Clarke, and eastward through the high dunes. This species has the appearance of the smaller species of *Eleocharis*.

2. **S. subterminalis** Torr. Aquatic, with weak culms 0.3-1 m. long and 1-1.5 mm. thick, from a slender rootstock; spikelets subcylindric, 6-13 mm. long; scales light brown.—Often producing submerged filiform leaves. In sloughs, Pine and Whiting, and eastward.

3. **S. debilis** Pursh. Culms tufted, 1-6 dm. tall, 1-1.5 mm. thick, triangular when dried; involucral bract often reflexed; spikelets in a head, 5-10 mm. long, ovoid, obtuse; scales greenish to light brown.—Muddy places, Tamarack Sta. to Miller. Hill reports plants with 5 bristles.

4. **S. Smithii** Gray. Similar to the preceding; involucral bract always erect; bristles 1 or 2 minute rudiments, or none.—A coastal plain species, rare in wet and muddy places. Whiting to Dune Park.

Var. setosus Fernald, with 4 or 5 bristles, also occurs in this region.

5. **S. americanus** Pers. Rootstocks stout; culms sharply three-angled, 0.2-1 m. tall, 3-6 mm. thick, or rarely as little as 1.5 mm; scales cilate, 2-cleft at apex. (*S. pungens* Vahl.)—Frequent in Wolf Lake and the Calumet District generally to Mineral Springs.

6. **S. Torreyi** Olney. Similar in aspect to the preceding; rootstock slender; bristles exceeding the achene.—Rare, Dune Park. Mrs. Chase reports root fibrous and dark red, as are the jointed shining runners connecting young and even old plants.

7. **S. validus** Vahl. (*Great Bulrush.*) Culms 0.5-2.5 m. tall, 0.8-2.5 cm. thick, soft and spongy, light green, from thick strong rootstocks; basal sheaths with thin, papery, torn margins; panicle lax and decompound; spikelets ovoid; scales reddish-brown, pubescent

on the back, with excurrent midribs. (*S. lacustris* of auths., not L.)—Common throughout in swales, marshes and wet prairies.

8. **S. acutus** Muhl. Resembling the preceding in general aspect, but culms firmer and less spongy, generally a little more slender and darker olive green; basal sheaths firmer, the margins furnished with fine fibres; inflorescence loose (or congested in forma *congestus* [Farwell] Fernald); spikelets typically cylindric, 1-2 cm. long; scales reddish-brown. (*S. occidentalis* Chase.)—Common, wet prairies, swales and bogs, along the Calumet System and in Wolf Lake, and on the tamarack bog at Mineral Springs.

9. **S. fluviatilis** (Torr.) Gray. Plants stout, from tough creeping rootstocks which bear globose corms; culms sharply triangular, 1-1.5 m. tall, 1-1.3 cm. thick; leaves long, keeled beneath; inflorescence usually open; spikelets solitary or in threes; scales light reddish-brown with excurrent midribs; achene sharply and equally triangular in cross-section, 4 mm. long.—Borders of lakes and streams. One of our largest species.

10. **S. lineatus** Michx. Culms tufted, 0.5-1.5 m. tall, 3 mm. thick, obscurely triangular or subterete; leaves pale green, stiff, 0.5-1 cm. broad; scales small and close, brown with green midribs; achene 1 mm. long, triangular in cross-section.—Infrequent, low ground, Roby, Clarke, and eastward.

11. **S. atrovirens** Muhl. Culms 0.8-1.5 m. tall, 0.5 mm. thick; leaves pale green, keeled; some of the rays reaching 5 cm. in length, or all very short in forma *sychnocephalus* (Cowles) Blake (var. *pychnocephalus* Fernald); scales crowded, dark brown with green midribs, sometimes with minute lustrous black lines; achene triangular, 1 mm. long, brown.—Rare and local, Dune Park, Clarke, Michigan City.

12. **S. polyphyllus** Vahl. Culms very leafy; inflorescence much as in the preceding; bristles 6, usually twice bent.—Occasional on marshes from Mineral Springs eastward.

13. **S. cyperinus** (L.) Kunth. (*Wool Grass.*) Culms 1-1.5 m. tall, 3-6 mm. thick, terete, smooth; leaves long, light green, and reticulated beneath, with upwardly roughened margins; inflorescences often 2 dm. long, very brown with woolly spikelets; involucels reddish; achene 0.8 mm. long, acuminate, light.— Common in muddy places, wet woods, sloughs, etc., throughout; and conspicuous in autumn on account of its densely woolly ample panicles.

Var. **pelius** Fernald. Involucels reddish-brown. Rare, Gibson, Dune Park and eastward.

14. **S. Eriophorum** Michx. Similar in habit, but coarser and taller; inflorescence reaching 3 dm. in length; rays often drooping; spikelets 3-6 mm. long; scales and "wool" reddish-brown or terra-cotta.—A rare coastal plain species, Clarke to Miller and Dune Park.

9. ERIOPHORUM L. Cotton Grass

Bristles very numerous, silky, much longer than the scales at maturity. Our species chiefly slender, bog or swamp plants with solitary, capitate or umbeled spikelets. The "cotton" is often used for stuffing pillows.

Leaves 1-1.5 mm. broad, channeled, the uppermost shorter than its sheath; involucre a single short bract	*E. gracile* 1.
Leaves 3-5 mm. broad, flat or somewhat folded, longer than their sheaths; involucre of 2 or more long flat bracts.	
Scales of the spikelet with one prominent rib.	
Rib not reaching the tip of the scale; upper leaf-sheaths dark at summit	*E. angustifolium* 2.
Rib reaching tip of the scale; leaf-sheaths sometimes reddened but not darkened at summit	*E. viride-carinatum* 3.
Scales of the spikelets with several prominent ribs	*E. virginicum* 4.

1. **E. gracile** Roth. Culms 3-6 dm. tall, 1-2 mm. thick; leaves smooth; spikelets 2-5, when young 0.8-1 cm. long, but 1.5-2.5 cm. long including the mature bristles; peduncles reaching 3 cm. in length; silky bristles white.—Rare at Clarke, Pine, and Miller. May-July (fruiting state).

2. **E. angustifolium** Roth. Culms 2-7 dm. tall, 3-5 mm. thick, smooth; spikelets 2-10, 1.5-4.5 cm. long, including the mature bristles; scales lead-colored to chestnut-brown, the nerveless tips membranous; peduncles sometimes reaching 9 cm. in length; bristles white, shining. (*E. polystachion* L. in part.)—Sandy edge of sloughs, rare, Port Chester and Miller. A northern species fruiting in June and July.

Var. **majus** Schultes with leaves 5-8 mm. broad also occurs.

3. **E. viride-carinatum** (Engelm.) Fernald. Somewhat resembling the preceding; scales greenish-drab to lead-color, firmer at the tip, the nerve somewhat roughened. — Sloughs, Clarke and Miller. Fruiting from May-August.

4. **E. virginicum** L. Culms wiry, 4-12 dm. tall, 1.5-3 mm. thick, smooth; involucral leaves 0.5-1.5 dm. long, spreading at maturity; spikelets crowded into a head, terra-cotta when young from the reddish scales and filaments; bristles copper-red or brown.—Frequent locally, Dune Park and Mineral Springs, especially on burned-over bogs. Fruiting from July-September.

Forma **album** (Gray) Wiegand, having the bristles white except at the base, is also found in this area.

10. FUIRENA Rottb. Umbrella Grass

Culms leafy; spikelets in digitate clusters; scales with a recurved awn from below the apex; flower with 3 stalked petal-like scales and 3 bristles; stamens 3; style 3-cleft; achene triangular, pointed with the persistent style-base.

1. **F. squarrosa** Michx. Culms 0.5-3 dm. tall; spikelets ovoid, pointed, with a shaggy appearance due to the recurved awns.—A plant of coastal origin, found in sloughs around Dune Park and Mud Lake.

11. HEMICARPHA Nees & Arn.

Plants dwarf; involucre 2-leaved, one leaf appearing to be a continuation of the culm; spikelets with a minute translucent scale between the axis and each flower; otherwise as in *Scirpus*.

Tips of the scales recurved; achenes minute, brown, cylindric, with close rows of low papillae.................... *H. micrantha* 1.

Scales without recurved tips; achenes ashy with fewer papillae.................................... *H. Drummondi* 2.

1. **H. micrantha** (Vahl) Pax. Plants 0.2-1.5 dm. tall; culms and short basal leaves smooth; involucral bract erect; shorter lateral bracts sometimes present; spikelets single or 2 or 3 together, 2-4 mm. long.—Sloughs and wet sandy ground, Miller and Dune Park. A coastal plain species.

2. **H. Drummondi** Nees. Similar to the preceding; scales broadly obovate or rhombic, the broad green midrib projecting as an appressed blunt tip.—Dune Park and Miller. A prairie species.

12. RYNCHOSPORA Vahl. Beak Rush

Spikelets in axillary and terminal clusters; scales loosely overlapping, the lower empty; stamens mostly 3; achene with a perianth of bristles and a conspicuous beak or tubercle. Leafy perennials with narrow leaves and ovoid, oblong, or spindle-shaped, variously clustered spikelets.

Spikelet 1.5-2 cm. long................................ *R. macrostachya* 1.
Spikelet less than 1 cm. long.
  Achene cross-wrinkled.............................. *R. cymosa* 2.
  Achene smooth.
    Spikelets whitish, or tawny with age................. *R. alba* 3.
    Spikelets chestnut-colored.
      Leaves bristle-form; spikelets in clusters of 3-6....... *R. capillacea* 4.
      Leaves narrowly linear; spikelets in clusters of 10 or more.................................. *R. capitellata* 5.

1. **R. macrostachya** Torr. Culms 0.5-2 m. tall; involucral leaves long; spikelets bearing each only one achene; achene 4-5 mm. long; bristles twice the length of the achene; tubercle 3-4 times as long as the achene, stiff, conspicuously exserted from the spikelet.—In dune meadows and sloughs; a coastal plain species found at Dune Park and Mud Lake.

2. **R. cymosa** Ell. Culms 0.3-1 m. tall, the smooth, flat leaves mostly crowded at the base; involucral leaves narrowly linear, shorter than or slightly surpassing the inflorescence; spikelets 2-3 mm. long, ovoid, in small heads of 3 or more; achene 1.5 mm. long, plump; bristles much shorter than the achene, upwardly barbed; tubercle narrower than the achene, much depressed.—In moist meadows, Tamarack Sta., Miller and Dune Park. A coastal plain species.

3. **R. alba** (L.) Vahl. Plants slender, 1.5-6 dm. tall; leaves very narrow; spikelets in 1-3 heads; bristles 9-20, about equalling the achene and its flattened tubercle.—Low ground and bogs, Dune Park and eastward.

4. **R. capillacea** Torr. Plants 1-4.5 dm. tall; culms and leaves thread-like; involucral bracts 1 or 2, exceeding or shorter than the inflorescence; spikelets 4-5 mm. long, ascending, each culm usually

bearing 2 or 3 heads, some of the culms so short that the plants seem to be flowering from top to bottom; achene 1.5 mm. long; tubercle about as long; bristles twice as long as the achene, downwardly barbed. —Marly shores, Porter Co. to Wolf Lake.

Var. leviseta E. J. Hill. Bristles smooth.—Edges of sloughs, Pine and Miller.

5. **E. capitellata** (Michx.) Vahl. Plants 1-10 dm. tall; leaves narrowly linear, mostly basal; involucral bracts single, much exceeding the inflorescences; heads single or 2 or 3 together, a few on rays; spikelets 2.5 mm. long; achene 1 mm. long, tubercle 1 mm. long; bristles mostly overtopping the tubercle, downwardly barbed. (*R. glomerata* of Gray's Manual; *R. capitellata* var. *minor* [Britton] Blake.) —Railroad ditches and edges of sloughs, Dune Park to Port Chester.

Var. **disculiens** (Clarke) Blake. Bristles smooth or barbed only at tip. (*R. glomerata* var. Clarke.)—Damp places, Miller, acc. to Blake.

13. **MARISCUS** Zinn. Twig Rush

Spikelets much like those of the preceding genus; perianth none; stamens 2; achene lacking a tubercle. (*Cladium* P. Br.)

1. **M. mariscoides** (Muhl.) Kuntze. Culm stout, 0.4-1 m. tall; leaves 1-3 mm. broad, channeled; inflorescence 0.5-3 dm. long, of umbelliform cymes; spikelets clustered in conspicuous heads; achenes with truncate base. (*Cladium* Torr.)—Wet prairies, shores of lakes, sloughs and lagoons, Roby to Mineral Springs.

14. **SCLERIA** Bergius. Nut Rush

Pistillate spikelets 1-flowered, usually mixed with the staminate; achene globular, of whitish, enamel-like texture, hard, usually on a disk-shaped base. Mostly low-growing plants from hard rootstocks.

Achene smooth .... *S. triglomerata* 1.
Achene roughened.
  Achene 1.5-2 mm. broad, with conspicuous disk; involucral leaves 1 mm. or more wide, several times as long as the fascicles.
    Achene with ridges; disk with 3 distinct tubercles...... *S. pauciflora* 2.
    Achenes reticulate or with pits; disk with 3 lobes coming up around the achene........................ *S. reticularis* 3.
  Achene 1 mm. broad; disk obsolete; involucral leaves bristle-like, barely exceeding or at most twice as long as the fascicles.......................... *S. verticillata* 4.

1. S. **triglomerata** Michx. Plants stout, 0.5-1 m. tall; leaves flat, rough, 3 mm. or more broad, with 1-3 conspicuous nerves; involucral leaves tapering to a sharp point, erect; fascicles several; achene 2-3 mm. long, with a small, minutely granulose, 3-lobed disk. —In low sandy soil and thin dry woods, East Chicago and Clarke to Dune Park.

2. **S. pauciflora** Muhl. Plants 2-6 dm. tall; culms slender, from stout, irregularly thickened rootstocks; leaves stiff, smooth; involucral leaves 2, the longer erect, the shorter lateral one ascending.—Dry meadows, Dune Park and Miller; also Furnessville.

3. **S. reticularis** Michx. Plants 1.5-7 dm. tall; culms slender, smooth; leaves smooth; fascicles 2 or 3, each with a single flat involucral bract; achene glabrous, with pits vertically arranged.—Pine barrens and damp sand, Dune Park. A coastal plain species.

Var. **pubescens** Britton. Leaves broader; achene somewhat, pubescent, with ridges more spirally arranged. A coastal plain variety.

4. **S. verticillata** Muhl. Plants 1-9 dm. tall; culms and leaves very slender, smooth; fascicles 3-5, sessile, 3-5 mm. broad, about 1 cm. apart.—Pine barrens, damp sand, and wet prairies, Roby and Pine to Miller, also banks of the Grand Calumet. Mrs. Chase notes plants 15-20 cm. high, the leaves longer than the culm, the sheaths pubescent with a tuft of tomentum at the top and the achene marked with high, short cross-ridges.

15. CAREX L. Sedge

Staminate and pistillate flowers intermixed, or in different parts of the same spike, or in different spikes (largely the latter); achene enclosed in a sac-like perigynium, close-fitting or inflated, which is in the axil of a scale. Grass-like perennials with 3-ranked leaves and, in our species, 3-angled achenes, or convex on one side, flat on the other.

The largest of our genera, and one of the largest in the world but the plants conspicuous only in the mass except for some of the last mentioned species with big, inflated perigynia. Except that they are often cut with other plants for wild hay, they have little economic value.

The ranges as given merely represent known stations for the species; actually the species may in many cases have a wider distribution in our area than present records indicate.

- Staminate and pistillate flowers in the same spike (VIGNEAE).
  - Staminate flowers at the base of the spikes, or scattered.
    - Perigynia with winged margins.
      - Perigynia ascending.
        - Perigynia more than ⅔ as broad as long.
          - Perigynia strongly nerved on the back.
            - Perigynia less than 2 mm. broad.
              - Spikes cylindric or ovoid.................. *C. tenera* 7.
              - Spikes globose.......................... *C. cristata* 5.
            - Perigynia 2 mm. or more broad.
              - Perigynia 5.6 mm. or less long............. *C. Bicknellii* 8.
              - Perigynia 5.5 mm. or more long.
                - Spikes 5-10, distinct.................... *C. Merritt-Fernaldii* 11.
                - Spikes 3-6, approximate or subapproximate. .... *C. brevior* 12.
          - Perigynia nerveless or faintly nerved on the back.
            - Scales of the pistillate spike rough-awned.... *C. alata* 9.

Scales of the pistillate spikes awnless......... *C. suberecta* 10.
Perigynia at least twice as long as broad.
Spikes 1.5 cm. or more long................. *C. muskingumensis* 1.
Spikes 12 mm. or less long.
Perigynia more than 5 mm. long.
Culms from an elongate rootstock. .... *C. siccata* 3.
Culms tufted......................... *C. scoparia* 2.
Perigynia less than 5 mm. long.
Perigynia thin, not distended over the achene........................ *C. tribuloides* 4.
Perigynia obviously distended over the achene.
Scales hidden by the mature perigynia.. *C. cristata* 5.
Scales not hidden.
Mature perigynia greenish or straw-colored..................... *C. mirabilis* 6.
Mature perigynia brown........... *C. Bebbii* 13.
Perigynia spreading or reflexed.
Spikes globose, closely many-flowered............ *C. cristata* 5.
Spikes ovoid, or if globose loosely few-flowered.
Perigynia broadest near the base.
Scales pointed........................... *C. stellulata* 14.
Scales blunt.............................
Leaves 1-2.5 mm. broad................... *C. scirpoides* 15.
Leaves about 0.5 mm. broad............... *C. Howei* 16.
Perigynia broadest near the middle............ *C. seorsa* 17.
Perigynia without winged margins.
Lowest bract seldom exceeding its spike.
Perigynia 4 mm. or more long.................. *C. bromoides* 20.
Perigynia less than 4 mm. long.
Spikes long, many-flowered; perigynia obscurely beaked.............................. *C. canescens* 18.
Spikes shorter, about 5-flowered; perigynia distinctly beaked....................... *C. brunnescens* 19.
Lowest bract nearly reaching the top of the inflorescence.................................. *C. trisperma* 21.
Staminate flowers at the summit of the spike.
Perigynia truncate at base, often stipitate.
Beak several times as long as the body of the perigynium.................................. *C. crus-corvi* 36.
Beak shorter than, or barely equalling, the body of the perigynium.
Leaves 1-3 mm. broad, plicate.
Sheaths not copper-colored at summit.......... *C. diandra* 32.
Sheaths copper-colored at summit.............. *C. prairea* 33.
Leaves 4-10 mm. broad, flat.
Perigynia triangular, gradually tapering to a beak.
Beak equalling or shorter than scale.......... *C. conjuncta* 34.
Beak much longer than pistillate scale........ *C. stipata* 35.
Perigynia ovoid, abruptly narrowed to a beak.
Achene 1 mm. long; style not thickened at base, broad............................ *C. alopecoidea* 29.
Achene 1.5-2 mm. broad; style thickened at base............................... *C. gravida* 30.
Perigynia rounded or cuneate at base.

- Spikes, except the uppermost, 1-3-flowered.......... *C. tenella* 22.
- Spikes many-flowered.
  - Perigynia nerveless or weakly nerved.
    - Leaves 4-9 mm. broad.
      - Mature perigynia brownish.................. *C. alopecoidea* 29.
      - Mature perigynia green.
        - Perigynia not stipitate.
          - Perigynia wing-margined to the base...... *C. sparganioides* 27.
          - Perigynia wing-margined only above the middle.......................... *C. cephaloidea* 28.
        - Perigynia stipitate...................... *C. gravida* 30.
    - Leaves 1-4 mm. broad.
      - Inflorescence moniliform.
        - Perigynia of uniform texture throughout.... *C. convoluta* 23.
        - Perigynia spongy below the middle......... *C. retroflexa* 24.
      - Inflorescence congested into one head......... *C. cephalophora* 26.
  - Perigynia strongly nerved.
    - Perigynia orbicular, rounded at base, 3 mm. or less long; scales with long awns exceeding the perigynia......................... *C. vulpinoidea* 31.
    - Perigynia ovate, usually somewhat cuneate at base, 3 mm. or more long, equalling or exceeding their scales.
      - Mature perigynia brownish; heads 2-8 cm. long. *C. Sartwellii* 37.
      - Mature perigynia green or greenish-yellow; heads 1-2 cm. long.................. *C. Muhlenbergii* 25.
- Staminate and pistillate flowers in different spikes, at least some spikes entirely pistillate (EUCAREX).
  - Style-branches 2; achenes lenticular or biconvex.
    - Spikes long-cylindric, closely flowered.
      - Lowest bracts equalling or shorter than the culm.... *C. stricta* 40.
      - Lowest bracts broad, exceeding the culm.
        - Scales greenish with long awns exceeding the perigynia .... *C. crinita* 38.
        - Scales dark brown, awnless, shorter than the perigynia .... *C. aquatilis* 39.
    - Spikes rarely 2 cm. long, loosely flowered............ *C. aurea* 41.
  - Style-branches 3; achenes trigonous.
    - Spikes solitary, terminal.
      - Perigynia with a long subulate beak................ *C. pauciflora* 42.
      - Perigynia blunt, hardly beaked................... *C. leptalea* 43.
    - Spikes 2 or more.
      - Perigynia not 2-toothed at apex.
        - Terminal spike with some pistillate flowers.
          - Spike many times longer than broad.
            - Perigynia pubescent........................ *C. virescens* 45.
            - Perigynia glabrous.
              - Perigynia strongly ribbed.
                - Perigynia about 15-ribbed .... *C. granularis* 69.
                - Perigynia with 2 strong and a few weak ribs............................ *C. gracillima* 47
              - Perigynia ribless or faintly nerved.
                - Perigynia as broad as long.............. *C. Shortiana* 48.
                - Perigynia several times as long as broad.. *C. debilis* 74.

- Spike not over 3 times as long as broad.
  - Beak shorter than the body of the perigynium, or none.
    - Perigynia very pubescent.................. *C. Swanii* 46.
    - Perigynia smooth.
      - Lowest bract several times exceeding the inflorescence..................... *C. viridula* 73.
      - Lowest bract about equalling the inflorescence .... *C. polygama* 44.
  - Beak equalling the body of the perigynium.
    - Perigynia 5-6 mm. long; beak rough and brownish-tipped.................... *C. flava* 71.
    - Perigynia 4-4.5 mm. long; beak whitish or tawny.......................... *C. cryptolepis* 72.
- Terminal spike entirely staminate.
  - Perigynia glabrous.
    - Perigynia ascending.
      - Leaves 1.5-3 cm. broad................... *C. plantaginea* 62.
      - Leaves less than 1.5 cm. broad.
        - Perigynia strongly nerved.
          - Pistillate scales awned.
            - Pistillate spikes all slender-peduncled. *C. laxiculmis* 63.
            - Pistillate spikes stout-peduncled, or upper sessile.
              - Uppermost bracts broad, exceeding the inflorescence........... *C. blanda* 65.
              - Uppermost bracts narrow, shorter than the inflorescence....... *C. conoidea* 66.
          - Pistillate scales not awned, sometimes short-cuspidate.
            - Pistillate spikes many-flowered.
              - Uppermost bract shorter than the staminate spike.
                - Leaves 2-3.5 mm. broad......... *C. tetanica* 55.
                - Leaves 3-7 mm. broad.......... *C. Meadii* 56.
              - Uppermost bract longer than the staminate spike.
                - Perigynia beakless, impressed-nerved.
                  - Perigynia 4.5-5.5 cm. long..... *C. grisea* 67.
                  - Perigynia 3-4 mm. long....... *C. glaucodea* 68.
                - Perigynia short-beaked, with elevated ribs............... *C. granularis* 69.
            - Pistillate spikes 5-7-flowered......... *C. digitalis* 64.
        - Perigynia, except for 2 marginal nerves, nerveless or very faintly nerved.
          - Leaves flat.
            - Lowest bracts of the involucre without sheaths.
              - Scales pale..................... *C. pallescens* 58.
              - Scales dark brown................ *C. paupercula* 59.
            - Lowest bract with sheaths........... *C. Crawei* 70.
          - Leaves involute-filiform............... *C. eburnea* 60.
    - Perigynia spreading or reflexed.
      - Beak shorter than the body of the perigynium. *C. viridula* 73.

Beak equalling the body of the perigynium.

Perigynia 5-6 mm. long; beak rough and brownish-tipped................ *C. flava* 71.

Perigynia 4-4.5 mm. long; beak whitish or tawny........................ *C. cryptolepis* 72.

Perigynia pubescent.

Pistillate spikes exceeding or nearly equalling the leaves.

Bracts of the pistillate spikes sheathless or with short green sheaths.

Plants not stoloniferous.

Perigynia tapering or slightly narrowed to tip....................... *C. scabrata* 75.

Perigynia abruptly narrowed to a slender beak.

Leaves 3-5 mm. broad; spikes remote. *C. communis* 52.

Leaves 1-2.5 mm. broad; spikes approximate.................. *C. varia* 53.

Plants strongly stoloniferous............ *C. pennsylvanica* 54.

Bracts of the pistillate spikes with prominent dark-purple sheaths................ *C. Richardsoni* 61.

Pistillate spikes, or some of them, hidden among the bases of the leaves.

Perigynia 2.5 mm. long, much exceeding the blunt scales...................... *C. deflexa* 51.

Perigynia 2.5-4.5 mm. long, slightly exceeding or equalled by the acuminate scales.

Perigynia entirely pubescent; leaves slender, bright green, ascending....... *C. umbellata* 49.

Perigynia glabrous except on the beak; leaves stiff, deep green, spreading .. *C. tonsa* 50.

Perigynia 2-toothed at apex.

Pistillate spikes, or some of them, hidden among the bases of the leaves.

Perigynia 2.5 mm. long, much exceeding the blunt scales................................ *C. deflexa* 51.

Perigynia 2.5-4.5 mm. long, slightly exceeding or equalled by the acuminate scales.

Perigynia entirely pubescent; leaves slender, bright green, ascending............... *C. umbellata* 49.

Perigynia glabrous except on the beak; leaves stiff, deep green, spreading............ *C. tonsa* 50.

Pistillate spikes not hidden among the bases of the leaves.

Perigynia firm and tough, closely investing the achene.

Perigynia glabrous.

Pistillate spike linear.

Perigynia abruptly narrowed to a beak.

Pistillate spike loosely 6-20-flowered .... *C. saltuensis* 57.

Pistillate spike closely many-flowered ... *C. scabrata* 75.

Perigynia not abruptly narrowed to a beak. *C. debilis* 74.

Pistillate spike ovoid.

Beak shorter than the body of the perigynium........................ *C. viridula* 73.

Beak equalling the body of the perigynium.

Perigynium 5-6 mm. long; beak rough and brownish-tipped .... *C. flava* 71.

Perigynium 4-4.5 mm. long; beak whitish or tawny........................ *C. cryptolepis* 72.

Perigynia pubescent.

Pistillate spikes 3-10-flowered.............. *C. pennsylvanica* 54.

Pistillate spikes many-flowered.

Leaves involute......................... *C. lasiocarpa* 76.

Leaves flat.............................. *C. lanuginosa* 77.

Perigynia thin and papery, inflated.

Pistillate spikes as broad as long.

Terminal spike with some pistillate flowers.. *C. squarrosa* 80.

Terminal spike entirely staminate.

Lowest perigynia of each spike reflexed... *C. Grayii* 85.

All perigynia spreading or ascending.

Lowest peduncles not over 1 cm. long... *C. intumescens* 86.

Lowest peduncles 2 cm. or more long... *C. folliculata* 76.

Pistillate spikes several times as long as broad.

Perigynia gradually tapering to a tip, not abruptly beaked.

Pistillate spikes loosely 1-12-flowered..... *C. intumescens* 86.

Pistillate spikes closely many-flowered.

Pistillate spikes 1-1.3 cm. thick........ *C. lacustris* 79.

Pistillate spikes 2-3 cm. thick .... *C. lupulina* 84.

Perigynia abruptly narrowed to a beak.

Leaves involute......................... *C. oligosperma* 78.

Leaves flat.

Staminate scales prolonged into long rough awns.

Leaves 6-16 mm. broad.

Pistillate spikes 1.3-1.7 cm. thick... *C. comosa* 81.

Pistillate spikes 2-3 cm. thick...... *C. lupulina* 84.

Leaves 4-6 mm. broad.............. *C. lurida* 83.

Staminate scales smooth.

Staminate spike solitary............ *C. hystericina* 82.

Staminate spikes 2 or more.

Culm sharply angled above....... *C. vesicaria* 88.

Culm obtusely angled above ...... *C. rostrata* 89.

1. **C. muskingumensis** Schwein. Plants 6-10 dm. tall; culms roughened above, very leafy, and mostly hidden below by the overlapping sheaths; leaves smooth, subcordate at junction with sheaths, 3-5 mm. broad, shorter than the inflorescence; spikes spindle-shaped, greenish to dark yellow; perigynia thin and scale-like, 7-9 mm. long, long-pointed, upwardly serrulate, 2-toothed.—Meadows, Clarke, acc. to Gates; Wheeler, acc. to Hill.

2. **C. scoparia** Schkuhr. Plants 0.2-1 m. tall; culms slightly roughened above; leaves 3 mm. or less wide, slightly scabrous on the margins, much shorter than the culms; spikes straw-colored or brownish; scales pointed, brown with green midribs; perigynia 4.5-6 mm. long, long-pointed, upwardly serrulate, 2-toothed at tip.—Low ground, Keiser to Indiana Harbor.

3. **C. siccata** Dewey. Culms slender, 1-6 dm. tall, from an elongated rootstock; leaves stiff, 1-3 mm. broad; inflorescence of 3-7 glossy brown spikes; perigynia 2 mm. broad, 5-6 mm. long.—Dry sandy open woods, Lake Co., acc. to Hill.

4. **C. tribuloides** Wahlenb. Plants 0.3-1 m. tall; leaves 3-8 mm. broad, slightly roughened on the margin, often overtopping the culm; spikes greenish or brownish; perigynia 3.7-5 mm. long, finely nerved on the inner face, upwardly serrulate, 2-toothed at tip.—Swales, East Chicago and Miller.

5. **C. cristata** Schwein. Culms 1 m. or less tall; leaves flat, 3-7 mm. broad, about as long as the culms, soft, smooth except on the margins; inflorescence dense, 1-4 cm. long, of 6-15 spikes; perigynia 3-4 mm. long, upwardly serrulate along the margins of the beak, their tips spreading. (*C. cristatella* Britton.)—Dune meadows, Tremont; Clarke, acc. to Gates.

6. **C. mirabilis** Dewey. Culms 0.3-1.5 m. tall, smooth; leaves soft and thin, 2.5-6 mm. broad; spikes 4-12, ovoid, 5-9 mm. long; perigynia 3-4 mm. long, with divergent tips. (*C. normalis* Mackenzie.) —Dune meadows and sandy fields.

7. **C. tenera** Dewey. Plants densely cespitose; culms slender, 3.7-5 dm. tall, exceeding the leaves; lower sheaths not exposed; lower leaves reduced, the upper flat, 1.5-2.5 mm. broad, roughened; inflorescence of 4-8 spikes, 2.5-5 cm. long; spikes 6-10 mm. long; perigynia suborbicular, 3.5 mm. long. (*C. straminea* of Gray's Manual.)—Edge of a slough, Dune Park.

8. **C. Bicknellii** Britton. Culms 4-9 dm. tall, coarsely striate, roughened below the summit, exceeding the leaves; leaves flat, stiff, 2-4.5 mm. broad, 1-1.5 dm. long; inflorescence of 3-7 silvery- or greenish-brown spikes; perigynia ovoid, short-beaked.—Swales, Dune Park.

9. **C. alata** Torr. Culms and leaves much as in the preceding; inflorescence crowded, of 3-8 compact subcylindric heads which are 8-15 mm. long; perigynia broadest near the apex, abruptly narrowed to a short beak.—Swales between East Chicago and Michigan City. A coastal plain species.

10. **C. suberecta** (Olney) Britton. Slender; leaves as in the preceding; heads brownish-yellow; perigynia gradually narrowed to the beak.—Damp prairie, Indiana Harbor; Roby; Clarke.

11. **C. Merritt-Fernaldii** Mackenzie. Culms stout, 0.5-1 m. tall; leaves stiff, 2-4 mm. broad, reaching 5 dm. in length, exceeded by the culms; spikes tawny, subglobose; perigynia broadest below the middle, gradually tapered to the beak. (*C. festucacea* of Gray's Manual.) —Along the Michigan Central tracks in the Calumet District; in sandy woods, Dune Park.

12. **C. brevior** (Dewey) Mackenzie. Similar to the preceding, but more slender and rarely more than 6 dm. tall.—Miller; Indiana Harbor; Porter Co., acc. to Lyon.

13. **C. Bebbii** Olney. Culms 2-6 dm. tall, slender, slightly exceeding the leaves; leaves soft, 1.7-4.5 mm. broad; inflorescence

crowded, of 3-12 globose ascending spikes, which are 5-8 mm. long, dull or olive-brown; perigynia few-nerved or nerveless.—Low sands, Miller.

14. **C. stellulata** Good. Plants tufted; culms 1-4 dm. tall, stiff, equalling or exceeding the leaves; leaves 1-2.5 dm. long, soft; inflorescence of 2-6 approximate or distant, 3-12-flowered, globose spikes; perigynia yellowish, ovate, faintly nerved or nerveless, the body nearly equalled by the beak.—Common around Clarke and Miller.

15. **C. scirpoides** Schkuhr. Resembling the preceding in habit; perigynia broader, faintly nerved or nerveless, the beak short.—Clarke and Miller, acc. to Pepoon.

16. **C. Howei** Mackenzie. Somewhat similar to the preceding; leaves 0.5 mm. broad, often inrolled; perigynia strongly nerved. (*C. scirpoides* var. *capillacea* of Gray's Manual.)—Swamps, Dune Park to Mineral Springs.

17. **C. seorsa** E. C. Howe. Plants loosely cespitose, 3.5-6.5 dm. tall; leaves shorter than the culms, soft, pale, 2-4 mm. broad; inflorescence of 2-6 remote subglobose 6-20-flowered greenish spikes, the terminal with a long-tapered base, the lowest with a thread-like bract. —Swamps, Keiser to Dune Park.

18. **C. canescens** L. Plants tufted, 1.5-6 dm. tall; culms slender, roughened above; leaves flat, 1.5-3 mm. broad, soft and smooth, about as long as the culms; spikes 4-7, short-cylindric, 5-8 mm. long; perigynia ovoid-oblong, 1.3-1.7 mm. long, 1-1.3 mm. broad, short-pointed at tip, about equalled by the scales.—Rare on bogs at Pine, acc. to H. & R.

19. **C. brunnescens** (Pers.) Poir. Plants tufted, slender, lax, 1.5-7 dm. tall; leaves soft, flat, 1-1.8 mm. broad; inflorescence 1-6 cm. long, of 3-6 subglobose spikes; perigynia 2-2.7 mm. long, 1-1.5 mm. broad, short-beaked.—Open woods, East Chicago.

20. **C. bromoides** Schkuhr. Culms lax, 3-8 dm. long; leaves mostly shorter; spikes 0.5-2 cm. long, narrow; perigynia ascending, strongly nerved, long-beaked.— Rare, in bogs, Tamarack, Tremont, and Calumet River.

21. **C. trisperma** Dewey. Plants densely tufted; culms thread-like, 2-7 dm. long, much overtopping the leaves; leaves soft, 1-2 mm. broad, pale green; inflorescence of 2-3 spikes, each 2-5-flowered; perigynia finely many-nerved, short-beaked, 3.3-3.8 mm. long, 1.6-1.8 mm. broad.—Tamarack bog at Mineral Springs, and westward in swamps or woods to Pine.

22. **C. tenella** Schkuhr. Plants loosely tufted; culms slender, 1-6 dm. tall, equalling or exceeding the leaves; leaves flat, soft, 1-1.8 mm. broad; inflorescence of 3-5 scattered spikes, the uppermost sometimes 4-6-flowered; perigynia finely nerved, with a minute entire beak.— Rare, in woods, East Chicago.

23. **C. convoluta** Mackenzie. Culms 2-7 dm. tall, exceeding the leaves; leaves about 2.5 mm. broad; spikes 9-12-flowered, the upper approximate, the lower distant; perigynia 3.2-4.5 mm. long, contracted to a beak which is conspicuously white-membranous at the opening. (*C. rosea* of Gray's Manual, not of Schkuhr.)—On bogs at Clarke.

24. **C. retroflexa** Muhl. Culms 1-6 dm. tall, exceeding the leaves; leaves 1-2.5 mm. broad; inflorescence much as in the preceding; perigynia nerveless, narrowed to a beak.—Clarke, acc. to Gates.

25. **C. Muhlenbergii** Schkuhr. Culms tufted, stiff, 2.5-8 dm. tall, much exceeding the leaves; leaves roughened on the margins, 2-4 mm. broad, pale green, stiff, flat or sometimes folded; inflorescence congested, with a few bracts which are thread-like or sometimes expanded at base; perigynia broad.—The commonest *Carex* on the high dunes, a characteristic plant of the open, dry, blowing sands. Found also in dry situations of the Calumet District, but not in the moist prairies.

26. **C. cephalophora** Muhl. Plants 2-7 dm. tall; culms slender; leaves soft and smooth except on the margins, flat, 2.1-8 mm. broad, strongly ascending, shorter than the culms; inflorescence very congested, 0.7-1.8 cm. long.—On open dunes.

27. **C. sparganioides** Muhl. Plants 4-10 dm. tall; leaves 5-9 mm. broad, their sheaths covering the base of the culm; spikes, except the uppermost, distinct, truncate at summit; perigynia 3-4 mm. long.—Woods and thickets throughout.

28. **C. cephaloidea** Dewey. Plants 3-9 dm. tall; leaves flat, longer than the culms; inflorescence congested, 1.8-3.8 cm. long; perigynia 3.5-4.5 mm. long.—Clarke, acc. to Gates.

29. **C. alopecoidea** Tuckerm. Plants 4-9 dm. tall; culms stout, sharply triangular, slightly roughened; leaves flat, about as long as the culms; inflorescence 2-6 cm. long; heads crowded or the lower distinct; perigynia stipitate, 3-4 mm. long, 1.5-2 mm. broad; achene 1 mm. broad.—Rare; in woods at Miller.

30. **C. gravida** Bailey. Culm sharply angled, 2-5 dm. tall, much exceeding the leaves; inflorescence compact, 2-4 cm. long; perigynia 3-4.5 mm. long, 2-3 mm. broad; achene 1.5-2 mm. broad.—Woods and marshes, Miller, East Chicago and Lake George.

31. **C. vulpinoidea** Michx. Plants 0.3-1 m. tall; culms about 2 mm. thick, smooth below, much roughened above; leaves roughened on the margins, 2-5 mm. broad, much exceeding the culms; involucral bract bristle-like; inflorescence congested, 2-15 cm. long.—Sandy hollows, Pine to Dune Creek.

32. **C. diandra** Schrank. Plants 3-8 dm. tall; culms and leaves as in the following; inflorescence erect; spikes crowded; perigynia shining, stipitate.—Sloughs, Pine.

33. **C. prairea** Dewey. Plants tufted, 0.5-1.2 m. tall; culms slender, of unequal heights, sharply triangular, roughened above; leaves flat, 1-2 mm. broad, roughened on the margins, shorter than the culms; upper part of the inflorescence often nodding; spikes scattered, 0.5-1 cm. long; scales shorter than the perigynia, long-pointed; perigynia brown, 3-3.5 mm. long, beaked. (*C. diandra* var. *ramosa* of Gray's Manual.)—Sloughs, Pine.

34. **C. conjuncta** Boott. Culm 0.5-1 m. tall, soft, 3 mm. thick, exceeding the leaves; inflorescence 3.5-7.5 cm. long, of about 8 short-cylindric heads; perigynia lance-ovate, yellow.—Swales, Clarke, acc. to Gates.

35. C. **stipata** Muhl. Similar in size and habit; perigynium plump, lanceolate, brown-nerved, 4 mm. long.—Low meadows, Keiser to Mineral Springs, and probably elsewhere.

36. C. **crus-corvi** Shuttlw. Plants 0.5-1 m. tall; culms about 3 mm. thick, sharply triangular, striate, shorter than the leaves, which are 6-12 mm. broad and upwardly roughened on the margins, and strongly veined; spikes crowded; perigynium strongly nerved, 6-7 mm. long, including the beak, base disk-like.—Swamps, Pine.

37. C. **Sartwellii** Dewey. Culms 0.3-1.2 m. tall, equalling or slightly exceeding the leaves, which are 2-5 m. broad, long-taper-pointed; inflorescence rather crowded, the spikes somewhat distinct below; spikelets short-cylindric; perigynia 3-5 mm. long.—Rare, borders of sloughs, acc. to Babcock.

38. C. **crinita** Lam. Culms stout, sharp, 0.3-1.6 m. tall, equalled or exceeded by the leaves, which are 4-10 mm. broad, the lower reduced to reddish-brown fibrillose sheaths; pistillate spikes 3-6. —Damp thickets and swales, Clarke and eastward to Tremont.

39. C. **aquatilis** Wahlenb. Culms 3-9 dm. tall, smooth; leaves 4-7 mm. broad, glaucous, much exceeding the culms; pistillate spikes 3-5, 1.5-5.5 cm. long, erect; perigynia ovate, nerveless.—Swamps and ponds, Clarke, Keiser, and probably elsewhere.

40. C. **stricta** Lam. Plants in tufts; culms 0.5-1.3 m. tall, slender; lower sheaths fibrillose; pistillate spikes 2-6, mostly sessile; perigynia tawny, few-nerved; beak usually entire.—Swamps, Griffith, Ross, and Clarke.

41. C. **aurea** Nutt. Culms usually many, 0.5-5 dm. tall, usually exceeded by the leaves; leaves pale green, 1-3 mm. broad, smooth; lowest bract exceeding the inflorescence; spikes 3-5, erect, yellow or brown; perigynia fleshy, plump, about 2 mm. long, short-tipped. —Wet meadows, Indiana Harbor, Roby and Pine.

42. C. **pauciflora** Lightf. Culms slender, stiff, 0.5-6 dm. tall, exceeding the very narrow leaves; perigynia 2-5, much exceeding the scales, deflexed and easily detached at maturity.—Bogs, Calumet District.

43. C. **leptalea** Wahlenb. Culms 0.5-5 dm. tall, exceeding the very narrow light green leaves; inflorescence a spike, 0.5-1.6 cm. long; perigynia alternate, oblong, not beaked.—Wet meadows, west of Michigan City.

44. C. **polygama** Schkuhr. Culms 2-9 dm. tall, sharp, exceeding the narrow rough leaves; spikes 2-7, sessile, approximate, or the lowest short-peduncled, dark brown; perigynia elliptic, beakless, whitish, exceeded by the scales.—Boggy land, Clarke to Dune Park.

45. C. **virescens** Muhl. Culms 0.4-1 m. tall, sharp, exceeding the flat, often hairy, leaves; spikes 2-4, sessile or nearly so, 2-4 mm. thick, compact, the terminal usually about half pistillate; perigynia nearly as broad as long, with a very short beak, or beakless.—In thickets, Calumet District and Furnessville.

46. C. **Swanii** (Fernald) Mackenzie. Similar to the preceding, but only 1.5-8 dm. tall; spikes shorter, 3-5 mm. thick; perigynia less strongly ribbed.—Dune meadows, Porter Co., acc. to Lyon.

47. C. **gracillima** Schwein. Culms 0.3-1 m. tall, usually exceeding the flat leaves; spikes 3-6, long-peduncled, loosely flowered at base, 2-6 cm. long, 2-3 mm. thick; perigynia ovoid, beakless, about twice as long as the scales.—Thickets and marshes, Pine, Roby to Keiser.

48. C. **Shortiana** Dewey. Culms 3-7 dm. tall, in small clumps; leaves flat, 0.4-1 cm. broad, somewhat longer than the culms; spikes 3-6, erect, 1-3.5 cm. long, 4-6 mm. thick, densely flowered; perigynia roughened, beakless.—Dune swales, and sandy ground of the Calumet District.

49. C. **umbellata** Schkuhr. Plants tufted, forming dense mats; leaves 0.5-2 dm. long, 1.5-2 mm. broad at flowering time, broader in age, exceeding all or nearly all the culms; sheaths deep red; perigynia 3.3-4.3 mm. long, plump; beak strongly 2-edged.—On front dunes, Dune Park, and in the Calumet District near Lake Michigan; generally found under *Pinus Banksiana*.

50. C. **tonsa** (Fernald) Bicknell. Similar in habit to the preceding; leaves 2.5-4 mm. broad, 5-25 cm. long, rough toward the apex; perigynia 3.5-4.5 mm. long; beak strongly 2-edged.—Wooded dunes above Mud Lake, and probably elsewhere.

51. C. **deflexa** Hornem. Culms loosely tufted, 3-10 cm. tall; leaves 6 cm. or less long, 1 mm. broad on fertile culms, broader on the sterile; perigynia puberulent, obtusely triangular, nerveless or nearly so, 1 mm. broad, with a beak 0.5 mm. long.—Thickets, Miller, acc. to Gates.

52. C. **communis** Bailey. Plant forming small tufts; culms 1-6 dm. tall, much exceeding the leaves; basal sheaths red; inflorescence of 1-6 distinct spikes; lowest bract leaf-like, barely equalling or exceeded by the inflorescence.—Rather common in dry sandy woods near Lake Michigan.

53. C. **varia** Muhl. Plants densely tufted; culms threadlike, 1-5 dm. long, about twice exceeding the leaves, which are 1-2.5 mm. broad, or rarely broader; lowest bract narrow, about equalling the inflorescence.—Dry woods, Whiting to Dune Park.

54. C. **pennsylvanica** Lam. Culms 0.5-4 dm. tall, exceeding or shorter than the leaves; basal sheaths reddish or brown, often with persistent brush-like tufts of fibers; leaves 1.5-3.5 mm. broad; perigynia ovoid, with a very short beak.—Front dunes, Dune Park, Miller, etc. Mrs. Chase notes plants tufted but not densely so. The only sedge which is, despite small stature, conspicuous in early spring; it is easily recognized by its showy tufts of yellow anthers.

55. C. **tetanica** Schkuhr. Culms 1-6 dm. tall, slightly exceeding the leaves; pistillate spikes 1-2, the lower very long-peduncled, linear; perigynia 2-3 mm. long, hardly beaked, longer than the chestnut-brown-margined scales; scales of the staminate spike rounded at the tip.—In a sedge swamp, Miller, and wet sandy ground, East Chicago; bogs, Mineral Springs.

56. C. **Meadii** Dewey. Similar to the preceding but stouter throughout; pistillate spikes oblong or linear-oblong. (*C. tetanica* var. Bailey.)—Rare, around Pine.

57. C. **saltuensis** Bailey. Culms slender, 2-8 dm. tall, exceeding the soft narrow leaves; pistillate spikes 1-2, peduncled from the inflated sheath of a leaf-like bract, very loosely flowered; staminate spike on a long peduncle; perigynia small, thin, beaked. (*C. vaginata* Tausch.)—Boggy ground, Clarke, acc. to E. J. Hill.

58. C. **pallescens** L. Culms 1-6 dm. tall; leaves narrow, the lower pubescent, especially on the sheaths; spikes 0.5-2 dm. long; perigynia beakless.—Reported by Hill from Berry Lake, a station now destroyed.

59. C. **paupercula** Michx. Culms 1-8 dm. tall, exceeding the leaves; lowest bract exceeding the culm; spikes slenderly peduncled, drooping, 1-1.6 cm. long; scales darker than the perigynia.—Sloughs near Pine, acc. to Hill.

60. C. **eburnea** Boott. Plants tufted from brown stolons; culms wiry, 1-4 dm. tall, about twice as long as the threadlike, curved leaves; staminate spike 4-8 mm. long, inconspicuous, overtopped by the upper pistillate spikes; pistillate spikes 2-4, erect; perigynia 1.5-2 mm. long, becoming black and shining.—On sand ridges, Pine and Clarke.

61. C. **Richardsoni** R. Br. Culms stiff, 1-3 dm. tall, about as long as the flat (2-4 mm. broad), stiff, light-green leaves; pistillate spikes 1-3, short-peduncled; staminate spike 1; scales pointed, red-brown, with a broad membranous margin; perigynia short-beaked.—In dry sand, Pine.

62. C. **plantaginea** Lam. Culms 2.5-5.5 dm. tall; leaves broad and flat, about half as long as the culm, appearing after the flowers and persisting over winter; staminate spike dark purple; pistillate spikes 3-4, loosely flowered, their peduncles mostly hidden by dark purple bladeless sheaths; perigynia 3-4.5 mm. long, beaked.—Rich shaded moist ground along the Grand Calumet, East Chicago, rare.

63. C. **laxiculmis** Schwein. Culms cespitose, slender and lax, 1.5-5.5 dm. long, exceeding the leaves, which are 6-12 mm. broad; spikes loosely few-flowered, remote, 0.7-1.5 mm. long, 3.5-5 mm. thick; perigynia sharply 3-angled, 2.8-3.2 mm. long, short-beaked.—Low dune woods.

64. C. **digitalis** Willd. Culms slender, 1.5-5 dm. tall, slightly exceeding the leaves; leaves bright green, narrow; pistillate spikes 2-4, on filiform peduncles; perigynia 2.5-3 mm. long, exceeding the acute whitish scales.—Woods and dry hollows, Clarke.

65. C. **blanda** Dewey. Culms 2.5-5 dm. tall, somewhat leafy; basal leaves much shorter than the culms, 4-12 mm. broad; pistillate spikes 5-30 mm. long, the lower pedicelled, with long broad bracts; staminate spike small, light straw-colored, inconspicuous; perigynia 2.4-3.8 mm. long, bent at tip. (*C. laxiflora* var. Boott.)—Meadows. Tremont, and northwestern Calumet District, acc. to Hill and Gates.

66. **C. conoidea** Schkuhr. Culms 1.5-7 dm. tall, exceeding the narrow leaves; pistillate spikes 2-3, the lower stalked; lowest bracts long, often nearly equalling the inflorescence; upper bracts shorter and much narrower; perigynia 3-4 mm. long, short-beaked.—Railroad ditch, Mineral Springs, and probably elsewhere.

67. **C. grisea** Wahlenb. Similar to the preceding; leaves soft and thin, slightly glaucous; perigynia rounded at base.—Low dune woods, Tremont.

68. **C. glaucodea** Tuckerm. Culms variable, the longest 1-6 dm. tall; leaves glaucous, 0.5-1 mm. broad; bracts nearly as wide as the leaves, exceeding the culm; pistillate spikes long-peduncled; staminate spike small, usually sessile; perigynia glaucous, 3-4 mm. long, beakless.—Swales, Clarke and East Chicago.

69. **C. granularis** Muhl. var. **Haleana** (Olney) Porter. Leaves glaucous, the basal 5-12 mm. broad; pistillate spikes 3-5 mm. thick; bracts as in the preceding; perigynia oblong, 2-3.5 mm. long, the beak usually bent.—Wet sand of the Calumet District, near Lake Michigan; dune meadows, Tremont.

70. **C. Crawei** Dewey. Plants stoloniferous, 0.5-4 dm. tall; leaves light green, 2-4 mm. broad, about equalling the culms; lowest spike long-peduncled, the upper almost sessile; perigynia often resinous-dotted, conspicuously lighter than the scales.—Wet sand, Pine.

71. **C. flava** L. Plants tufted, yellowish throughout; culms 2-8 dm. tall; leaves 2-5 mm. broad; pistillate spikes 2-6, aggregated, occasionally staminate at tip.—Wet sandy ground, Calumet District.

72. **C. cryptolepis** Mackenzie. Similar; greener; leaves 1.5-3 mm. broad. (*C. flava* var. *rectirostra* Gaudin and var. *elatior* Schlecht., in part.)—Wolf Lake, acc. to Mackenzie; Pine, acc. to Pepoon; Tremont, acc. to Lyon.

73. **C. viridula** Michx. Culms 0.5-6 dm. tall, about twice as long as the leaves; leaves 1-2.5 mm. broad, folded; lowest bract leaf-like, much exceeding the inflorescence; spikes crowded, the terminal often pistillate at tip. (*C. Oederi* Retz. var. *pumila* Fernald.)—Marshy ground around Wolf Lake and Pine.

74. **C. debilis** Michx. var. **Rudgei** Bailey. Culms slender, leafy, 0.1-1 m. tall; leaves 3-5 mm. broad, wavy or drooping; spikes 3 or 4, drooping; perigynia soft and thin, 4.5-6 mm. long, twice exceeding the blunt white-edged scales.—Oak woods, Tamarack Station.

75. **C. scabrata** Schwein. Culms stout, 2-8 dm. tall, sharply and roughly angled; leaves 6-18 mm. broad, rough, about equalling the leaves; bracts leafy, somewhat exceeding the inflorescence; pistillate spikes 2-6, 1-6 cm. long; perigynia broadly ovoid, few-nerved, rough.—Rare, in sloughs, Indiana Harbor.

76. **C. lasiocarpa** Ehrh. Culms 0.5-1 m. tall, very slender, many together from a stout rootstock, about equalled by the leaves; spikes 1-3, sessile, the lowest bract equalling the inflorescence; perigynia with very short teeth. (*C. filiformis* of auths., not L.)—Clarke, Indiana Harbor.

77. **C. lanuginosa** Michx. Habit much as in the preceding; leaves 2-5 mm. broad.—Wet meadows, Clarke to Tremont.

C. lanuginosa × C. impressa (Wright) Mackenzie is a hybrid taken near Tamarack Station by Deam, and at East Chicago by Mrs. Chase, who notes: "Pistillate spikes sometimes loosely flowered at base." But *C. impressa* is not known from our area by any specimens or reports, though this would not preclude the possibility of the presence of a self-perpetuating hybrid descended from it.

78. **C. oligosperma** Michx. Culms 2.5-9 dm. tall, slender, stiff, about equalled by the stiff leaves; staminate spike peduncled, dark orange, very slender; pistillate spikes 1-2 (3), globular, or short-oblong, few-flowered; perigynia shining, few-nerved.—Peat bogs and cranberry marshes, Miller; sometimes in dry oak barrens eastward.

79. **C. lacustris** Willd. Rootstock stout, with long, coarse scales; culms 0.6-1.3 m. tall, exceeded by the leaves which are 0.5-1.5 cm. broad; lower sheaths bearing abundant fibres; pistillate spikes 2-4, peduncled, closely many-flowered; staminate spikes 1-4. (*C. riparia* W. Curtis.)—Along the Grand Calumet at Clarke and Miller, and in the tamarack bog at Mineral Springs; Keiser, acc. to Lyon.

80. **C. squarrosa** L. Culms 3-9 dm. tall, exceeded by the leaves; leaves weak, 2.5-6 mm. broad; lowest bracts exceeding the inflorescence; spikes 1-4, the terminal two-thirds pistillate; all appearing prickly, from the spreading tips of the perigynia.—Sloughs near East Chicago, infrequent.

81. **C. comosa** Boott. Culms stout, 0.5-1.5 m. tall, exceeding the leaves; leaves, bracts, and sheaths covered with little nodules; lowest bracts leafy, much exceeding the inflorescence; staminate spikes 1 or 2; pistillate usually 4 or 5, drooping; perigynia with long beak, and spreading teeth 1.2-2 mm. long.—In shallow water of the Grand Calumet and east to the tamarack bog at Mineral Springs.

C. comosa × C. hystericina var. Dudleyi Dewey is a hybrid collected at Wolf Lake by Peattie, and reported from East Chicago by H. & R., who note: "Some of the plants were remarkable for the character of the staminate spikes, which had fertile flowers variously intermixed, sometimes one-half fertile, usually the upper part."

82. **C. hystericina** Muhl. Culms slender, about 1 m. tall, exceeding the leaves; pistillate spikes 2-5, all but the upper on slender peduncles, drooping, 1-1.5 cm. thick, 1.5-6 cm. long; perigynia greenish or straw-colored, strongly nerved, slender-beaked.—On wet swales, Pine and Miller and probably elsewhere.

83. **C. lurida** Wahlenb. Culms 0.2-1 m. tall, stout, smooth, obtusely angled, exceeded by the leaves; lower bracts many times exceeding the inflorescence; staminate spike solitary; pistillate spikes 2-4, 1.5-2 cm. thick, 1.5-6 cm. long; perigynia thin and shining, strongly nerved, the body about equalling the slender beak.—In a backwater of Trail Creek, Michigan City. Also Tamarack Sta. and Tremont.

84. **C. lupulina** Muhl. Culms stout, 4-9 dm. tall; the numerous leaves 0.6-1 cm. broad, exceeding the culm; lower bracts many times exceeding inflorescence; staminate spike solitary, sessile, 3-6 cm. long,

coarse; pistillate spikes 2-6, crowded, 3-6 cm. long, of hop-like aspect; perigynia much inflated, 1.3-2 cm. long.—Swamps in the high dune country and westward close to Lake Michigan.

85. **C. Grayii** Carey. Culms stout, 0.3-1 m. tall; leaves on the culm, exceeding it, pale green, harsh, 6-11 mm. broad; bracts leaf-like, exceeding the inflorescence; pistillate spikes 1 or 2, globular, 6-30-flowered; perigynia 1.5-2 cm. long, strongly nerved. (*C. Asa-Grayi* Bailey.)—Wet meadows, Clarke and Tremont.

86. **C. intumescens** Rudge. Culms slender, 0.3-1 m. tall; leaves on the culms and exceeding them, dark green, soft, 3-8 mm. broad; bracts exceeding the inflorescence; pistillate spikes 1-3, oblong, loosely-flowered; perigynia 1-1.5 cm. long, strongly nerved.—In mud at the mouth of Dune Creek, and marshes, Tamarack Sta.

87. **C. folliculata** L. In habit similar to the preceding; leaves yellowish-green; perigynia less inflated.—Meadows, Port Chester to Tamarack Station.

88. **C. vesicaria** L., var. **monile** (Tuckerm.) Fernald. Culms 0.4-1 m. tall, exceeded by the leaves; staminate spikes 2-3; pistillate spikes 2-3, remote, 2-7 cm. long; perigynia roundish, about 6 mm. long, abruptly tapering to a beak.—A northern species, in boggy ground, Clarke, acc. to Gates.

89. **C. rostrata** Stokes var. **utriculata** (Boott) Bailey. Culms stout, 0.3-1 m. tall, spongy at base; leaves pale green, 0.2-1 cm. wide, bearing nodules; staminate spikes 2-4; pistillate spikes 2-4, 1-2 cm. thick; perigynia 0.5-1 cm. long, tapering to a beak.—Sloughs of the northwestern Calumet District.

PICKEREL-WEED FAMILY (Pontederiaceae)

Perennial aquatic or mud plants. Flowers more or less irregular, perfect, bursting from a spathe. Perianth all petaloid, 6-parted, the 3 or 6 mostly unequal stamens inserted on its throat; style 1, stigma 3-lobed or 6-toothed. Fruit a 3-celled, many-seeded capsule or 1-celled utricle. After flowering the perianth is sometimes spirally recoiled.

Flowers 2-lipped; stamens 6; fruit a 1-seeded utricle........	*Pontederia* 1.
Flowers regular; stamens 3; fruit a many-seeded capsule....	*Zosterella* 2.

1. PONTEDERIA L. Pickerel-weed

Rootstocks thick, creeping; stems stout, bearing 1 leaf; leaves long-petioled, the basal ones with a sheathing stipule in the axis of the petiole; flowers in a spike; the lower lip with 3 divisions, separate to the base but overlapping to form a curving perianth tube, spreading out as a lip at the tip; the upper 3 divisions united to form a three-lobed upper lip; the anterior stamens hanging out of the flower, the other three unequally inserted lower down on very short filaments; anthers blue.

1. **P. cordata** L. Stem stout, 3-12 dm. tall; leaves bluntly heart-shaped, spike dense, from a spathe-like bract; flowers violet-blue or white with a pair of yellow spots on the upper lip. (*Unisema* Raf.) —Borders of ponds, in slow streams and lakes, very common, and abundant throughout our area. June-October. After flowering the lobes and upper part of the perianth-tube wither above while the persistent base hardens around the fruit.

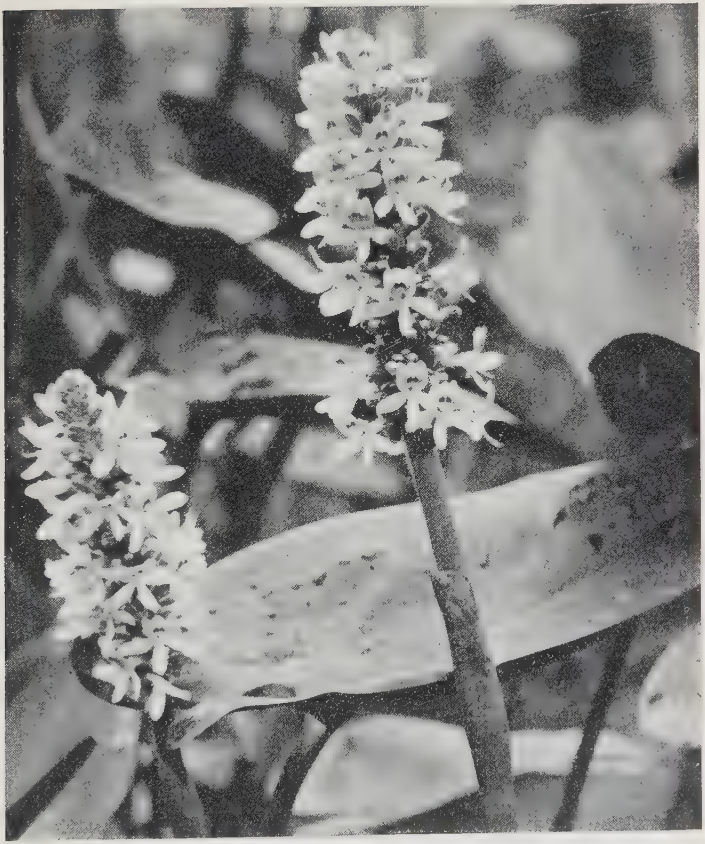


FIG. 2. PICKEREL-WEED (*Pontederia cordata*)

2. ZOSTERELLA Small. Water Star Grass

Stems creeping, ascending, or floating; leaves petioled, grass-like; spathe 1- or few-flowered, borne in the sheathing base of a petiole; perianth salver-shaped, with a slender tube, the lobes almost regular, 6-parted. Stamens all alike, inserted in the throat of the perianth. Ovary spindle-shaped. Fruit a many-seeded capsule enclosed in the withered perianth tube.

1. **Z. dubia** (Jacq.) Small. Stems long, wavy, bearing the grass-like, linear, translucent, submersed leaves; the solitary flowers floating on the surface of the water, bright pale yellow, with very long thread-like perianth tube; stamens all alike; anthers arrow-shaped. (*Heteranthera dubia* MacM.; *H. graminea* Vahl.)—Quiet waters, Wolf Lake. Summer.

ARUM FAMILY (Araceae)

Leaves simple or compound; flowers arranged on a spadix or central axis, usually partly enveloped by the spathe which is a modified curling leaf that may be more or less colored or petal-like; flowers perfect or the sexes on separate plants or in the separate parts of one spadix; the fruit is usually a berry. Plants pervaded by an acrid smarting juice.

Spadix elongated or short-cylindric but not globose.	
Sepals none; at least some of the flowers unisexual.	
Flowers covering only the base of the spadix; leaves compound	*Arisaema* 1.
Flowers covering the whole spadix; leaves simple, usually arrow-shaped	*Peltandra* 2.
Sepals present; at least the lower flowers perfect	*Calla* 3.
Spadix globose, enveloped in a very fleshy ovoid spathe; sepals 4; flowers perfect	*Symplocarpus* 4.

1. ARISAEMA Martius. Indian Turnip

Low perennial herbs with a tuberous rootstock or corm; stem simple, sheathed at the base by the leaf-stalks of the compound veiny leaves; spathe curled around the spadix at the base, but at the upper end arched over it or long extended; male flowers each consisting of a cluster of anthers; female flowers each a 1-celled ovary without sepals; fruit a few-seeded scarlet berry.

Leaves mostly 2, divided into 3 elliptical-ovate leaflets; spadix subcylindric or club-shaped, obtuse, shorter than the spathe	*A. triphyllum* 1.
Leaves usually only one, pedately parted into 7-11 oblong-lanceolate leaflets; spadix tapering into a long slender point beyond the spathe	*A. Dracontium* 2.

1. **A. triphyllum** (L.) Schott. (*Jack-in-the-pulpit.*) Corm wrinkled, turnip-shaped; spadix generally all female or all male; spathe and leaf-sheaths variegated with purple, green, and white, or wholly green. (Var. *viride* Farwell.)—The corm is intensely acrid and

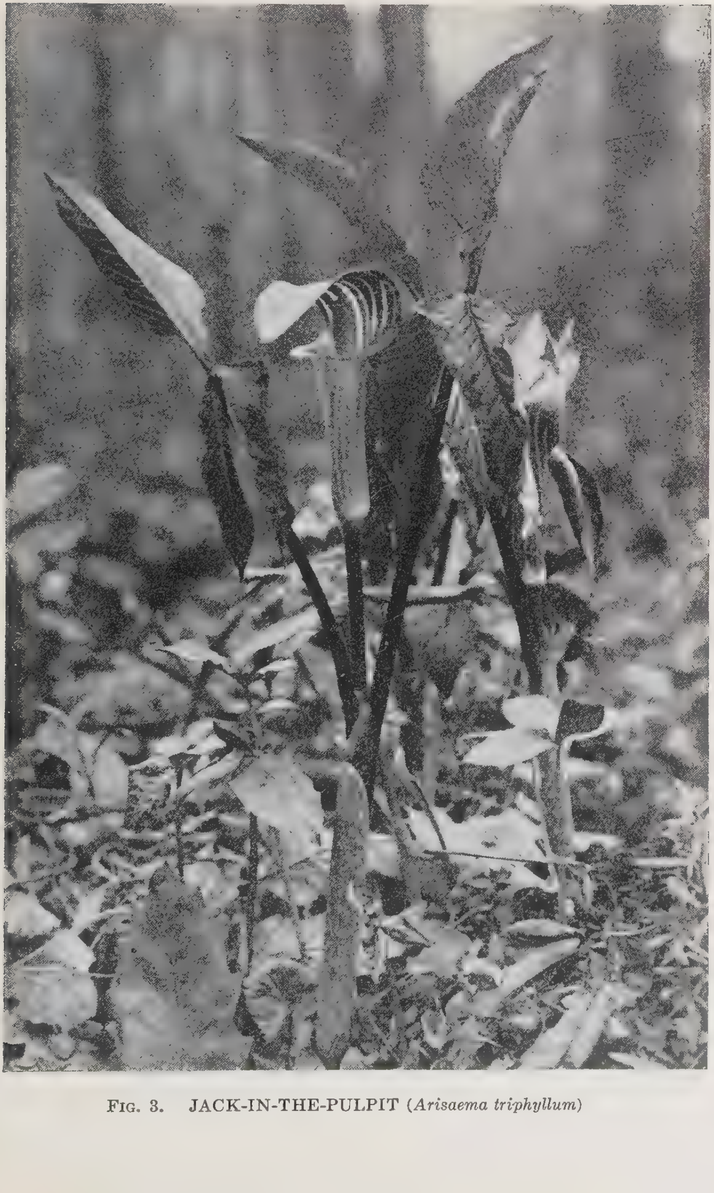


FIG. 3. JACK-IN-THE-PULPIT (*Arisaema triphyllum*)

poisonous but if boiled in several waters is edible and starchy. Frequent in rich woods along creeks, Miller and eastward through the dune country. May, June.

2. **A. Dracontium** (L.) Schott. (*Green Dragon, Dragon Root.*) Corms clustered; petiole 3-6 dm. long, longer than the peduncle; spadix of both male and female flowers; spathe greenish, oblong, twisted-pointed. (*Muricauda* Small.)—In low swampy woods, Dune Creek, where rather abundant, rare or absent elsewhere. June.

2. PELTANDRA Raf. Arrow Arum

Herbs with arrow-shaped, 3-nerved, pinnately veined leaves and simple leafless stems from a fibrous thick rootstock; spathe curled around the spadix throughout its length; spadix long and tapering; anthers covering the upper part of the spadix, ovaries the lower, each with 4-5 scale-like white staminodia; no sepals present. Fruit a head of ovoid fleshy berries borne on the spathe.

1. **P. virginica** (L.) Kunth. Stem 2-3.5 dm. tall, the leaves about as long, their basal lobes long and often acute; spathe green, with a wavy margin; the upper (male) portion several times longer than the lower (female); berries green.—At maturity the stem recurves, immersing the fruit in water. In shallow water and mud, Wolf Lake, and occasionally elsewhere in streams and dune ponds. June. The variable leaf shapes are several. In our area forma *hastifolia* Blake, with halberd-shaped leaves, is often seen.

3. CALLA L. Water Arum

Low perennial herbs with long creeping rootstocks and heart-shaped, long-petioled leaves; scapes solitary; spathe ovate, abruptly spreading; flowers covering the whole of the short-cylindric spadix, the lower perfect with 6 stamens, the upper often with stamens only; berries red, distinct, the few seeds surrounded with jelly.

1. **C. palustris** L. Rootstocks covered with sheathing scales and with fibrous roots at the nodes; petioles 10-20 cm. long; leaves thick, entire, abruptly acute at the apex; spathe abruptly acute and long-tipped.—In cold bogs, at Tamarack Sta. acc. to Nieuwland, rare. Summer.

4. SYMPLOCARPUS Salisb. Skunk Cabbage

Perennial herbs with very thick rootstocks and a cluster of large, veiny, broad, entire leaves; spathes and spadix short, broad; sepals 4; stamens 4; style 4-angled; stigmas small; fruit a globular or ovoid mass consisting of the spongy enlarged spadix which encloses the seeds.

1. **S. foetidus** (L.) Nutt. Leaves heart-shaped at base, ovate, short-stalked, 3-6 dm. long; spathe appearing before the leaves, barely emerging from the ground, incurved, spotted green and purple.

(*Spathyema* Raf.)—A curious plant with unpleasant odor, but its spathes not unattractive as they arise in early spring, often from the snow. Rich woods and moist prairies, but not in dune sands. March-July.

DUCKWEED FAMILY (Lemnaceae)

Stemless free-floating plants without distinct stem or foliage, being merely a flattish green body or thallus with usually hanging roots beneath or none, and one or few flowers on the same plant; fruit small, bladdery, 1-7-seeded.

Some of the smallest of all flowering plants; flowers and fruit rarely seen; reproduction is chiefly by growth of new cells from a cleft in the edge of the parent thallus and by autumnal minute bulblets which lie dormant on the bottom of the water in winter but rise and grow in spring. These plants frequently give a jade-green appearance to stagnant pools and lagoons, when this color is not due to algae.

Thallus with several rootlets, 5-15-nerved or with no nerves.	*Spirodela* 1.
Thallus with 1 rootlet or none, 1-5-nerved................	*Lemna* 2.
Thallus thick, without rootlets or nerves, submerged.......	*Wolffia* 3.

1. SPIRODELA Schleid. Duckweed

Rootlets small; thallus disk-shaped, the lateral branches accompanied by a single 2-parted rudimentary leaf; flowers borne in a cleft of the thallus, three of them together, surrounded by a spathe, two of them male, consisting of a single stamen, one of them female, consisting of a simple ovary, the whole appearing like a single bisexual flower.

1. **S. polyrhiza** (L.) Schleid. Thallus roundish, 3-8 mm. long, dark green above, below convex and purple, palmately mostly 7-nerved.—Floating in bays and quiet waters, frequent throughout. Also in Lake Michigan itself.

2. LEMNA L. Duckweed

Flowers as in the preceding; rudimentary leaf none.

Thalluses oblong, long-stalked at base, remaining connected with each other................................	*L. trisulca* 1.
Thalluses oblong to elliptic or roundish, sessile, soon separated from each other.	
Thallus obovate or roundish-obovate, slightly 3-nerved...	*L. perpusilla* 2.
Thallus round to elliptic-obovate, thick and very obscurely 3-nerved....................................	*L. minor* 3.

1. **L. trisulca** L. Rootlets often lacking; thallus 6-10 mm. long, tapering at the base into a slender stalk, denticulate at the tip, obscurely 3-nerved; spathe sac-like.—In Wolf Lake and the Grand Calumet. Usually several series of offshoots (by means of which, rather than by the rare seeds, the plants of this genus chiefly reproduce) may be seen together.

2. **L. perpusilla** Torr. Thallus 2-3 mm. long.—Very rare, in Wolf Lake.

3. **L. minor** L. Thallus 2-5 mm. broad, spathe sac-like.—Common on pools, slow rivers and lakes, especially Wolf Lake.

3. WOLFFIA Horkel. Duckweed

Fronds rootless; flowers only 2, central, bursting through the upper surface of the globular thallus; one flower consisting of a single stamen, the other a globular ovary; fruit spherical.

1. **W. columbiana** Karst. Plant 0.7-1.5 mm. long, light green, globular.—Floating beneath the surface of the water, Miller and Wolf Lake. Very rare, except in certain years.

DAY-FLOWER FAMILY (Commelinaceae)

Herbs with fibrous roots and jointed and often branching leafy stems; flowers perfect, often irregular; sepals green, herbaceous, persistent; petals ephemeral; some of the stamens often sterile; style 1, stigma undivided; fruit a 2-3-valved capsule; leaves entire, sheathed at the base, the uppermost often spathe-like.

Perfect stamens 3 (rarely 2) with glabrous filaments; petals unequal; bracts spathe-like........................	*Commelina* 2.
Perfect stamens 6 with hairy filaments; petals all alike; bracts leafy...	*Tradescantia* 1.

1. TRADESCANTIA L. Spiderwort. Prairie Bluebell

Perennials with sticky juice in the stems; leaves keeled; flowers in umbelled clusters; floral leaves nearly like the others; flowers regular; capsule 1-2-seeded.

Sepals villous; bracts (spathes) soon deflexed..............	*T. virginiana* 1.
Sepals entirely glabrous, or one or more of them with a tuft of hair near the apex; bracts (spathes) ascending.....	*T. reflexa* 2.

1. **T. virginiana** L. Leaves flat, linear, the upper pubescent; bracts elongated, leaf-like, ascending; pedicels villous; petals 1.5-2 cm. long, purplish blue, rarely white.—Common on oak dunes and prairies. June-August.

2. **T. reflexa** Raf. Glabrous or nearly so and glaucous; leaves strongly incurled; umbels many-flowered; narrow bracts and pedicels soon deflexed; petals 10-14 mm. long, blue or rarely white.—Frequent on shaded dunes. June-August.

2. COMMELINA L. Day-flower

Low plants, often half creeping and rooting at the joints; leaves narrowed at base to sheathing petioles; floral leaf heart-shaped and clasping, folded or hooded, forming a spathe inclosing the flowers which expand for a single morning; before and after flowering they are recurved on the pedicel; petals blue, the two lateral rounded or kidney-shaped, on long claws, the odd one smaller; sepals somewhat colored, the 2 lateral partly united; 3 withered stamens accompany the fertile ones.

All 3 cavities of the ovary only 1-ovuled; the capsule 3-celled, each cell 1-seeded; flowers 2 mm. or less broad...... *C. virginica* 1.

Two of the cavities of the ovary 2-celled, one 1-celled; capsule 2-celled; each cell 2-seeded; flowers 4 mm. broad or more.. *C. communis* 2.

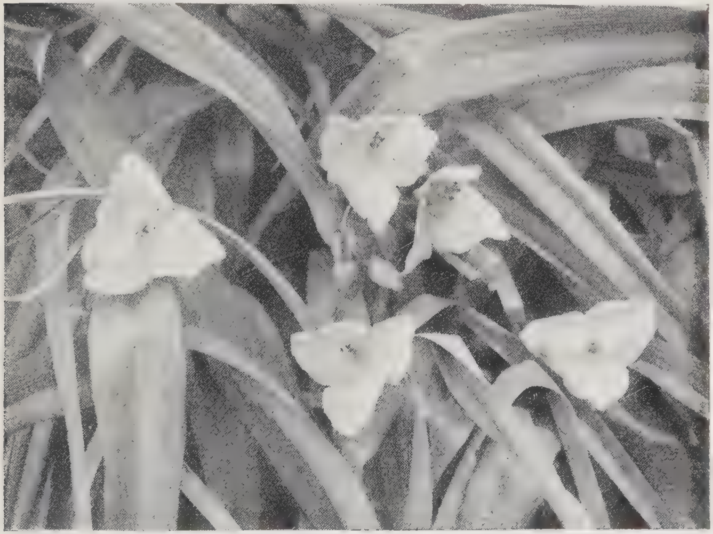


FIG. 4. SPIDERWORT (*Tradescantia virginiana*)

1. **C. virginica** L. Stems tufted, diffusely branched, somewhat stout, erect or ascending, 4-9 dm. long; leaves lanceolate or linear-lanceolate; sheaths inflated, the opening often fringed; spathes several, usually peduncled, the 2 bracts acute or acuminate, distinct. —Common in open sandy soil, throughout. June-September.

2. **C. communis** L. Separated by no important vegetative characters from the preceding; stems rather slender, decumbent and rooting at the joints, or ascending; leaves lanceolate or oblong-lanceolate in typical form, the sheaths white-membranous with green veins; spathes few; flowers deep blue. -Common in dry open soil, throughout. By some authorities reckoned a naturalized tropical weed, but in our region having the habits of a native plant as well, sometimes, as those of a weedy adventive.

Var. **verticillata** Peattie. Stems stout, tall, the branches all in verticels of 3-5; leaves broadly ovate, acute or slightly acuminate; large, ovate-lanceolate, papery bracts accompanying each verticel on the stem.—In dry open soil, Pine, and perhaps elsewhere.

YELLOW-EYED GRASS FAMILY (Xyridaceae)

Rush-like herbs with narrow leaves sheathing the base of a naked stem; heads terminal, consisting of perfect 3-androus flowers with a dark papery calyx and a regular, colored corolla; fruit a 3-valved capsule.

1. XYRIS L. Yellow-eyed Grass

Perennials with flowers single in the axils of leathery scaly bracts which are densely overlapping in a head; sepals 3, the 2 lateral ones persistent and boat-shaped, the other larger and deciduous with a corolla of 3 clawed, more or less cohering, yellow petals, and 3 antherbearing and 3 sterile stamens which are cleft and bearded; style 3-cleft; capsule oblong, many-seeded.

Base bulbous; keel of the lateral sepals ciliolate............ *X. torta* 2.
Base not bulbous; keel of the lateral sepals with an erose wing. *X. caroliniana* 1.

1. **X. caroliniana** Walt. Roots tufted, of delicate fibres; stems slender, straight or twisted, 2-edged above, 3-6 dm. tall; leaves grass-like; fruiting heads 8-10 mm. thick; seeds irregularly ribbed, ovoid-spindle-shaped, claret-colored when ripe. (*X. anceps* Pers.)—Often tufted, the short rootstocks connecting the plants; sandy shores, Dune Park. August. A coastal plain species.

2. **X. torta** Smith. Stem 3-6 dm. tall, twisted and flexuous, slightly compressed near the top; leaves grass-like, narrowly linear; heads subglobose, about 1 cm. long. (*X. flexuosa* Muhl.; *X. bulbosa* Kunth.)—A pretty little plant, abundant along the railroad ditches from Miller to Tremont and in wet ground from East Chicago southward. August.

PIPEWORT FAMILY (Eriocaulaceae)

Aquatic or marsh herbs with a tuft of fibrous roots and a cluster of narrow grassy basal leaves and naked stems sheathed at the base. Flowers in small button-like heads, minute, 2-3-merous, each in an axil of a papery bract; the perianth is generally double and chaffy; fruit a 2-3-seeded capsule.

1. ERIOCAULON L. Pipewort

Low plants with smooth, translucent, loosely cellular leaves and short, ropy rootstocks; stems low, smooth, except at the base of the woolly flowers and the white-bearded tips of the bracts; sexes in different flowers but both kinds in the same head; the male flowers have a calyx of 2 or 3 keeled or boat-shaped sepals; corolla tubular, 2-3-lobed, each of the lobes with a black gland spot; stamens 1 in each calyx. Female flowers have a calyx as in the male except that it is often remote from the flower and hence appears more like bractlets; corolla not tubular but rather of 2 or 3 narrow petals; ovary 2-3-lobed, often stalked; style 1; stigmas 2 or 3. Fruit a membranous capsule.

1. **E. septangulare** With. Stems 1 or several, 5-15 cm. tall or longer if submersed, grooved, slender; leaves soft, awl-shaped; heads 5-9 mm. broad, depressed-globose, the chaff and bracts lead-colored, with a short coarse white beard. (*E. articulatum* Morong.)—A curious little plant with the flowers simulating the structure of one of the *Compositae;* it floats on ponds or bogs or grows in mud along their borders. In our area known only from Mud Lake and its vicinity. The nearest other station in Indiana is Wahob Lake, in central Porter County. A northeastern plant, found over an erratic range which includes the west coast of Ireland. Summer. Seeds wind-distributed.

RUSH FAMILY (Juncaceae)

Sedge-like plants with small regular persistent flowers consisting in 3 papery stiff sepals and 3 similar petals, and 3 or 6 stamens and a single short style with 3 filiform hairy stigmas; ovary 1- or 3-celled, the fruit a 3-valved capsule. Resembling sedges in vegetative ways, but flowers lily-like though minute.

Capsule many-seeded; plants never hairy.................. *Juncus* 1.
Capsule 3-seeded; plants often hairy..................... *Luzula* 2.

1. JUNCUS L. Rush

Smooth perennials (annual in No. 1) with pithy or hollow and simple stems and cymose or clustered, small, greenish or brownish flowers; capsule 3-celled or falsely 1-celled.

Chiefly plants in wet or moist habitats, abundant in our region. They bloom in summer unless otherwise noted. For identification fruiting specimens are preferable.

- Leaves reduced to bladeless mucronate basal sheaths; leaf of the inflorescence seemingly continuous with the stem, the inflorescence therefore appearing lateral; stem naked, tall, erect.
  - Stamens 3; seeds large (1 mm. long).................... *J. balticus* 7.
  - Stamens 6; seeds small (0.5 mm. long).................. *J. effusus* 8.
- Leaves with well developed grass-like blades; inflorescence clearly terminal.
  - Leaves hollow, with cross partitions, appearing jointed when dry, usually roundish in cross-section; flowers not subtended by bracteoles, except the bractlet at the base of the pedicel.
    - Seeds with definite caudate tips.
      - Seed ellipsoid, barely 1 mm. long, with very short tail.. *J. brachycephalus* 9.
      - Seed spindle-shaped, with conspicuous tails.

Inflorescence elongate, strict and narrow, 3-6 times longer than broad; capsule much exceeding the calyx, gradually tapering; seed about 1 mm. long.............................. *J. brevicaudatus* 10.

Inflorescence ovoid or broader, when fully expanded ⅓ longer than broad, the glomerules many-flowered; capsule equaling the calyx, abruptly short-pointed; seeds 1-1.18 mm. long. *J. canadensis* 11.

Seeds merely pointed or blunt, not caudate.

Flowers solitary or in twos, often accompanied or replaced by fascicles of small leaves............ *J. pelocarpus* 12.

Flowers 5 or more together, in spherical heads, not accompanied or replaced by fascicles of small leaves.

Glomerules spherical; capsules subulate or lance-subulate, 1-celled; seeds ovoid, abruptly pointed.

Cyme much longer than the involucral leaf...... *J. scirpoides* 14.

Cyme overtopped by the involucral leaf.

Rootstock slender, tuber-bearing; heads 8-80-flowered.

Stem and leaves slender; heads 8-20-flowered *J. nodosus* 13.

Stem and leaves thick; heads 30-80-flowered *J. Torreyi* 15.

Rootstock thick and white; heads 2-10-flowered *J. brachycarpus* 16.

Glomerules hemispherical.

Flowers greenish or straw-colored; capsules light brown or straw-colored................. *J. acuminatus* 17.

Flowers brown; capsule dark brown.

Branches of the inflorescence widely divergent. *J. articulatus* 18.

Branches of the inflorescence erect or strongly ascending.......................... *J. alpinus* 19.

Leaves neither jointed nor with cross partitions, either channeled on the upper surface or flattened.

Flowers crowded in 2-10-flowered heads.............. *J. marginatus* 20.

Flowers solitary along the branches of the inflorescence.

Inflorescence, exclusive of its leaves, more than ¾ the height of the plant........................ *J. bufonius* 1.

Inflorescence, exclusive of its leaves, less than ¾ the height of the plant.

Capsule red, dark brown, or blackish, exceeding or barely equalled by the sepals.

Seeds with long caudate appendages............ *J. Gerardi* 5.

Seeds blunt or short-pointed .... *J. Greenei* 6.

Capsule pale brown or straw-color.

Auricles of the leaf-sheaths cartilaginous, yellowish when dry................................ *J. Dudleyi* 4.

Auricles of the leaf-sheaths membranaceous or practically so, paler.

Auricles at the summit of the sheaths conspicuously extended beyond point of insertion. *J. tenuis* 2.

Auricles at summit of sheaths not conspicuously extended beyond point of insertion..... *J. interior* 3.

1. **J. bufonius** L. (*Toad Rush.*) Stems annual, low, slender, leafy, often much branched from the base; cymes spreading; flowers remote, sometimes replaced by leafy tufts; sepals and petals very narrow,

bristle-like at the tip; capsule obtuse, 3-celled, mucronate.—A weedy species, in sand along roadsides, Roby to Clarke and Miller.

2. **J. tenuis** Willd. (*Yard Rush.*) Stem low, wiry; leaves all basal, slender, curling inward in drying; cyme loose; flowers aggregated at the tips of branches; sepals very acute.—A weedy species, frequent about dooryards and farms and in sandy or clay soil.

Var. **anthelatus** Wiegand. Tall (4-9 dm.) and loose in habit; cyme loose and long, 6-18 cm.; flowers small, 2.5-3.5 mm. long.—Frequent with the type

3. **J. interior** Wiegand. Rather stout, 4.5-9 dm. tall; leaf-sheath covering about ⅓ of the stem; inflorescence with strongly ascending branches, 3-10 dm. long; capsule obscurely 3-celled.—A spring-flowering prairie species, Calumet District and occasionally eastward among the dunes, in wet sand.

4. **J. Dudleyi** Wiegand. Plant 0.2-1 m. tall; stems stiff; leaves about half as long as the scapes; flowers 4-5 mm. long, dense, the segments yellowish green, spreading; capsule 3-lobed, 1-celled; seeds 3.5-4.5 mm. long.—Rare, along the Grand Calumet River.

5. **J. Gerardi** Loisel. (*Black-grass.*) Stems rigid, 1.5-8 dm. tall; basal leaves with loosely clasping auriculate sheaths, the long blades flat or curling in; cyme contracted, usually longer than the bracteal leaf; petals and sepals with green midrib and broad dark brown margins, straw-colored in age; stamens 6.—A striking, dark, tufted plant usually found on salt marshes; in our area very rare, known only from brackish wet sand, Indiana Harbor.

6. **J. Greenei** Oakes & Tuckerm. Stems 2-8 dm. tall, rigid; leaves deeply channeled on the inner surface, and almost curled in; cyme 1-6 cm. long, usually much shorter than the involucral leaf, generally dense; sepals light brown, appressed; seeds ovoid, ribbed and delicately cross-lined.—Conspicuous on account of its large colored capsules; a coastal plain species. In wet sand, Whiting to Miller and Clarke.

7. **J. balticus** Willd. var. **littoralis** Engelm. Stem 0.3-1 m. tall, rigid; cymes lax; flowers chestnut brown with green; capsule rather triangular, black-brown; seeds delicately ribbed and cross-lined.—A plant of the lake shore and binding sand or sometimes, when in clumps, assisting as a nucleus in dune formation. A northern species.

8. **J. effusus** L. var. **solutus** Fernald & Wiegand. (*Soft Rush.*) Stems hollow, 3-12 dm. tall, soft and pliant, light green; cyme diffusely and irregularly spreading, many-flowered; flowers large; summit of the uppermost sheath narrowed, much paler above; capsule blunt, greenish, triangular-ovoid.—In marshy ground, a handsome and very common plant throughout our area. July, August.

9. **J. brachycephalus** (Engelm.) Buchenau. Stems slender, 2.5-7 dm. tall; flowering heads small, numerous, 3-5-flowered; cymes large and spreading; flowers greenish or light brown; capsule abruptly short-pointed, brown.—In boggy ground, Roby and Pine, not frequent.

10. J. **brevicaudatus** (Engelm.) Fernald. Stem 1.5-7 dm. tall, slender; heads few, dark brown, 3-7-flowered, in a contracted, erect cyme; stamens 3; capsule dark brown.—In damp and muddy places and boggy ground, Pine and Miller.

11. J. **canadensis** J. Gay. Stems stout, rigid, 4-12 dm. tall, tufted; cyme spreading, decompound, heads numerous, 5-50-flowered; flowers greenish or light brown; stamens 3.—Swampy ground and common along dunes, frequent throughout.

12. J. **pelocarpus** Mey. Stem slender, 0.5-5 dm. tall, with a few knotted thread-like leaves; cyme compound, spreading; flowers small, greenish and red; stamens 6.—A species with slender rootstocks sending up numerous stems. Often proliferous. In boggy ground and wet swales, Clarke, Long Lake, etc.

13. J. **nodosus** L. Rootstock nearly scaleless, with tuber-like thickenings; stems slender, 1.5-6 dm. tall; heads several- to many-flowered; flowers reddish brown; stamens 6; capsule lanceolate-subulate, 3-sided, exceeding the sepals.—In marshy ground and on edges of old lagoons, East Chicago, eastward near the lake to Grand Beach.

14. J. **scirpoides** Lam. Stems 2-8 dm. long, from thick horizontal rootstocks; inflorescence constricted, heads 20-30; stamens 3; capsule with a long beak, exceeding the perianth. (*J. polycephalus* Michx.) —Edges of sloughs, Wolf Lake to Dune Park.

15. J. **Torreyi** Coville. Stems stout, 2-10 dm. long, from slender horizontal rootstocks with small tuber-like thickenings; inflorescence congested, of 1-20 large heads; stamens 6; capsule lance-oblong, 3-sided, subulate.—In wet sandy ground, common throughout.

16. J. **brachycarpus** Engelm. 4-9 dm. tall; leaves about 2; heads 7-11 mm. in diam., densely flowered; cyme crowded, much exceeding the involucral leaf; flowers pale green; seeds 0.3 mm. long, with an abrupt minute tip.—Damp sands, Keiser (*Churchill*). Summer.

17. J. **acuminatus** Michx. Stems 2-8 dm. long, few together; inflorescence with 5-50 heads or reduced even to a single head, the branches spreading; heads 3-20-flowered, small; stamens 3; capsule broadly acute, mucronate, light brown, equalling the perianth; heads often proliferous.—In swampy ground, frequent near Lake Michigan.

18. J. **articulatus** L. Stems 2-6 dm. tall, tufted; inflorescence spreading; heads 6-12-flowered; flowers reddish brown with green midrib, or green throughout; stamens 6; capsule brown, longer than the perianth, sharply 3-angled, tapering to a conspicuous tip.—In wet sandy ground, Wolf Lake.

19. J. **alpinus** Vill. var. **insignis** Fries. Stem 0.6-5 dm. tall, from a creeping rootstock; cyme bearing a few distant small dark-brown heads, each with one or more flowers elevated on a slender pedicel; flowers greenish or straw-color; capsule obtuse, short-pointed, pale brown.—Wet shores, and marshes, frequent throughout, even on Lake Michigan beaches.

20. J. **marginatus** Rostk. At base bearing bulbs and stolons; leaves grass-like, linear, those of the stem appearing opposite; flowers

green or purplish, the sepals very acute, exceeded by the petals which are as long as the nearly blunt subglobose capsule; seeds strongly ribbed, pointed at both ends.—Frequent in moist sand, Dune Park and probably elsewhere.

J. setaceus Rostk., a southern coastal plain plant of salt marshes, has been reported by Pepoon from our area but specimens have not been seen.

2. LUZULA DC. Wood Rush

Perennials with flat, soft, grass-like leaves and crowded, spiked or umbelled flowers; capsule 1-celled.

1. L. intermedia (Thuill.) A. Nels. Roots few and inconspicuous; stem 1.5-6 dm. tall, densely tufted; leaves linear, flat, hairy; spikes 3-12, subcylindric or subglobose, on ascending or erect peduncles; calyx rusty or chestnut color, brown or green; capsule obtuse; seeds conically appendaged. (*Juncus multiflorus* Ehrh.; *Juncoides campestre* var. *multiflorum* Sheldon; *L. campestris* var. *multiflora* Celak.) —Common in dry soil, especially thin woods, throughout. Early spring.

LILY FAMILY (Liliaceae)

Herbs, or in *Smilax* sometimes woody vines, with regular and symmetrical, 6-androus flowers (except *Maianthemum*); perianth parts all petal-like, except in *Trillium* which has green sepals, and free from the 3- (or 6-) celled ovary; stamens 6 or 4; fruit a pod or berry; flowers not from a spathe except in *Allium*.

Aletris, a genus often included in the *Liliaceae*, is in this work referred to the family *Haemodoraceae*.

Flowers unisexual	*Smilax* 14.
Flowers bisexual.	
Flowers 4-parted	*Maianthemum* 8.
Flowers 6-parted.	
Perianth segments united practically all the way into a true tubular or jug-shaped corolla	*Polygonatum* 11.
Perianth segments distinct, or united less than half their length.	
Styles 3, distinct.	
Sepals green and leaf-like; petals colored, soft-textured	*Trillium* 13.
Sepals and petals similar.	
Styles stigmatic down the inner side, crimson, conspicuous	*Medeola* 12.
Styles terminal	*Tofieldia* 2.
Style only one, sometimes 3-cleft to below the middle.	
Style 3-cleft to below the middle	*Uvularia* 3.
Style single, sometimes lobed but not deeply cleft.	
Flowers expanding from a spathe; plants with the odor of onion	*Allium* 1.
Flowers not expanding from a spathe, and without onion odor.	
Perianth segments united below the middle	*Hemerocallis* 4.

Perianth segments wholly distinct.
  Flowers axillary among filiform "leaves" (apparent leaves, the true leaves being reduced to scales) .... *Asparagus* 9.
  Flowers terminal.
    Flowers racemose or paniculate.
      Style short and thick .... *Smilacina* 10.
      Style thread-like .... *Camassia* 6.
    Flowers umbelled or solitary.
      Flowers greenish-yellow, small; leaves basal .... *Clintonia* 7.
      Flowers red, orange, or bright yellow, large; leaves on the stem, chiefly whorled .... *Lilium* 5.

1. ALLIUM L. Onion

Strong-scented herbs with papery spathes and flowers in a simple umbel (sometimes replaced by bulblets); perianth parts distinct or united at the very base, becoming dry and papery and more or less persistent; fruit 3-lobed, 3-valved, with 1-2 black seeds in each of the cells.

Garlic, chives and onion are cultivated species of this genus grown in our region.

Ovary and capsule not crested; flowers erect, greenish to white.
  Ovary strongly 3-lobed .... *A. tricoccum* 1.
  Ovary scarcely lobed .... *A. canadense* 2.
Ovary and capsule conspicuously crested; flowers nodding, rose or purple .... *A. cernuum* 3.

1. **A. tricoccum** Ait. (*Wild Leek.*) Stem 1.5-4 dm. tall, from a cluster of pointed bulbs; leaves appearing in early spring and withering before the flowers bloom, 10-23 cm. long, 3-6 cm. broad; umbel many-flowered; perianth greenish white; capsule strongly 3-lobed. (*Vallidalium* Small.)—Prairies and thickets of the Calumet District and in rich woods along Dune Creek; rare except locally. June.

A. sibiricum L. (*Chives*), differing from the preceding in having linear leaves nearly round in cross section, and an unlobed or nearly unlobed capsule, is sometimes found as a weed near our western borders.

2. **A. canadense** L. (*Wild Garlic.*) Bulb small, fibrous-coated; perianth segments long and narrow; flowers often wholly replaced by bulbs.—Occasional in rich prairie swale margins, rich woods, and dune meadows. May-June.

3. **A. cernuum** Roth. (*Wild Onion.*) Stem 2.5-6 dm. tall, angular; umbel loose; leaves flattened, linear, keeled, 3 dm. long.—A pretty plant, from the Indian name for which, it is said, Chicago derives its name.

2. TOFIELDIA Huds. False Asphodel

Slender tufted perennials with short or creeping rhizomes and simple stems leafy only at base; leaves grass-like, 2-ranked; flowers in a close raceme, small, with white or greenish sepals; fruit a capsule.

1. **T. glutinosa** (Michx.) Pers. Very sticky, with dark glands; stem 1.5-4.5 dm. tall; leaves broadly linear, short; pedicels in fascicles of 3; capsule thin; seeds with a contorted tail at each end. (*Triantha* House.)—A curious little plant, on the edges of drying sloughs and around tamarack bogs, East Chicago and Pine to Dune Park. Summer.

3. UVULARIA L. Bell Flower

Rootstock short; roots fleshy; stems low, forking above, more or less sheathed by the leaves; flowers drooping, lily-like but much smaller, narrowly bell-shaped; stamens short; capsule truncate, tough, 3-lobed; seeds with a white thin aril, few in each cell.

1. **U. grandiflora** Sm. (*Corn Lily.*) Stem naked or with one leaf; leaves acuminate, whitish-pubescent beneath; flowers corn-yellow; capsule obtusely lobed.—Low rich woods back of the high dunes, Tremont, Keiser and Furnessville. Early spring.

4. HEMEROCALLIS L. Day-lily

Showy, fleshy-fibrous-rooted perennials with long, keeled, linear, 2-ranked leaves; stems tall, bearing at the summit the bracted large flowers; perianth funnelform, lily-like, the 6 stamens inserted on its throat; capsule 3-angled, 3-valved, at first fleshy, containing several spherical black seeds in each cell.

1. **H. fulva** L. Petals wavy, obtuse, tawny orange. The flowers bloom only for a single day.—A handsome garden plant, escaped from cult. near towns; intr. from Eu. Summer.

5. LILIUM L. Lily

Bulbs scaly; leaves sessile; flowers large, showy, the perianth funnelform or bell-shaped; capsule subcylindric; seeds numerous in two rows in each cell. Includes many garden species such as the tiger lily, *L. tigrinum*, which occasionally establish themselves around cities.

Bulbs without rhizomes; flowers erect; perianth parts narrowed into claws	*L. philadelphicum* 1.
Bulbs with rhizomes; flowers nodding; sepals not clawed....	*L. superbum* 2.

1. **L. philadelphicum** L. var. **andinum** (Nutt.) Ker. Stem 4-8 dm. tall; leaves linear-lanceolate, all alternate except the uppermost which are whorled; flowers 1-3, open-bell-shaped, deep red, the lanceolate segments not recurved; pod narrowed at the base. (*L. umbel-*

latum Pursh.)—Common showy flower on the borders of sloughs and wet prairies, pine woods and swampy thickets in the Calumet District and east in the high dunes. June, July. True *L. philadelphicum* is reported by Pepoon as rare in our area.

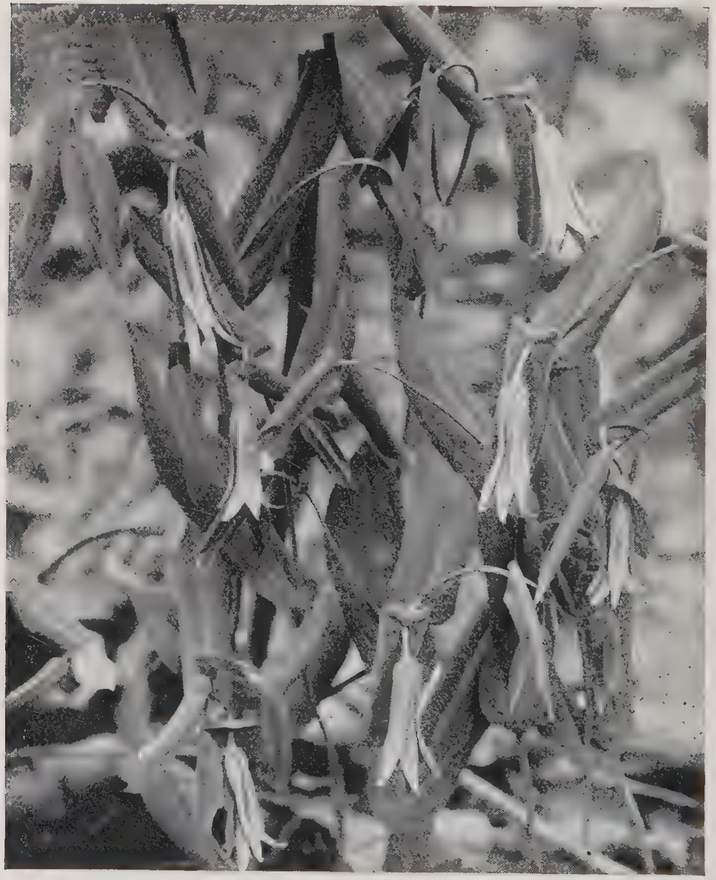


FIG. 5. BELL FLOWER (*Uvularia grandiflora*)

2. **L. superbum** L. (*Turk's Cap Lily.*) Stem 9-25 dm. tall; leaves narrowed at both ends, lanceolate or oblong-lanceolate, the lower whorled; flowers 3-40 in a pyramidal raceme; divisions of the perianth

7-8 cm. long, orange with dark purple or brown spots, strongly recurved; pods obovoid.—Abundant on the richer soil of the prairie region, and rarer eastward, as in rich soil along Dune Creek. Early summer.

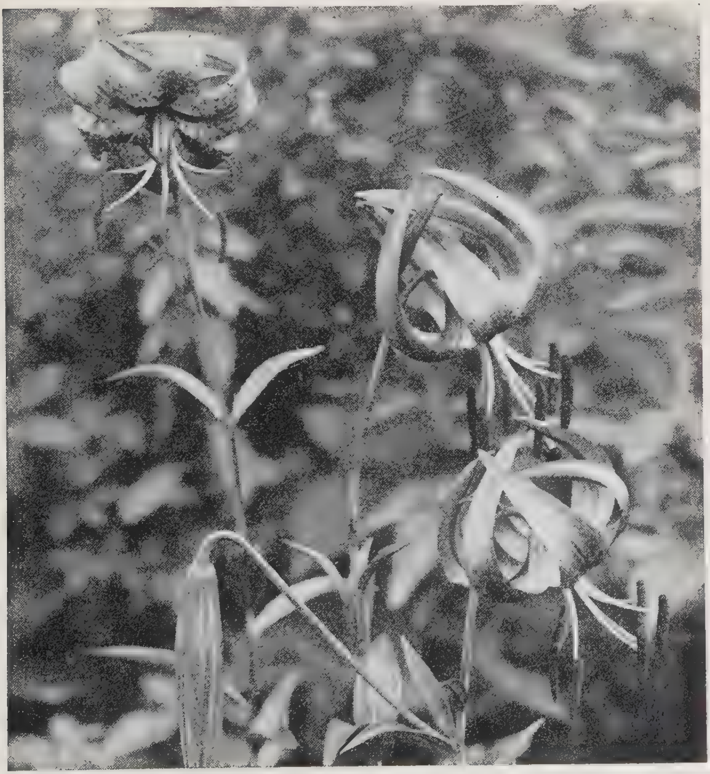


FIG. 6. TURK'S CAP LILY (*Lilium superbum*)

Lilium canadense L., similar to the preceding, but with smooth leaves, has been reported from Aetna (Deam) but no specimens have been seen. It is possible that *L. michiganense* Farwell is found in the region. According to Farwell *L. canadense* is probably not found west of the Alleghenies and is generally mistaken for *L. michiganense*, which is described by its author as having "leaves remotely whorled, 6-10 in a whorl, 3-7-nerved and rough on nerves beneath as well as on the margins, lanceolate to ovate-lanceolate; flowers in a pyramidal cluster (2-4 axial from uppermost whorl and about 4 racemosely disposed on the terminal portion of the stem), the peduncles 10-12 cm. long, often bearing a foliaceous bract near the middle."

According to W. R. Mills, Proc. Ia. Acad. Sci., XXXI, 265-270 (1926), our plant is *L. michiganense*, both *L. superbum* and *L. canadense* being eastern species that differ from our plant in color and especially in character of root-systems.

6. CAMASSIA. Quamash. Camass

Bulbous; linear leaves basal; flowers in a bracted raceme on jointed pedicels; perianth slightly irregular, the divisions each 3-7-nerved; capsule short, thick, 3-angled, each cell containing several round black seeds.

1. **C. esculenta** (Ker) Robinson. (*Wild Hyacinth.*) Stem 1.5-7 dm. tall; flowers light blue or rarely white, 10-15 mm. long. (*Quamasia* Coville; *Q. hyacinthina* Britton; not *C. esculenta* Lindl.)—Occasional in rich soil on prairies of the Calumet District from Pine southward. A very handsome plant resembling hyacinth. Its bulbs were eaten by the Indians. Summer.

7. CLINTONIA Raf. Dogberry

Perennials with creeping rootstocks and large, oblong or oval, ciliate leaves; fruit a berry.

1. **C. borealis** (Ait.) Raf. Stem 15-25 cm. tall, leaves as long; umbel 3-6-flowered, often accompanied by sessile lateral umbels; perianth downy outside, greenish yellow within, 12-18 mm. long; berry ovoid, dark blue.—In cold moist woods, especially Nyssa woods, from Miller eastward to Michigan City. Summer.

8. MAIANTHEMUM Weber

Low plants with slender rootstocks, few-leaved stems and small white flowers in a terminal raceme; pedicels 2-3 together; stamens 4; berry globular, 1-2-seeded.

1. **M. canadense** Desf. Stem 6-22 cm. tall; leaves 1-2, practically sessile, cordate at base; perianth segments only 2 mm. long. (*Unifolium* Greene.)—In moist woods and mossy spots, particularly Nyssa woods, Clarke and eastward to Michigan City. Spring.

Var. interius Fernald with pilose rachis and stem is found with the type in our area.

9. ASPARAGUS L. Asparagus

Perennials with widely branching stems, thick rootstocks and narrowly threadlike branchlets which resemble leaves; the true leaves reduced to small axillary scales; flowers axillary on jointed pedicels; fruit a berry.

1. **A. officinalis L., var. utilis L.** (*Garden Asparagus.*) Very tall, feathery plant with small greenish-white jug-shaped nodding flowers. —Escaped from cult. and abundant in the open sands of the dunes and close to the beach. The early spring shoots, thick and scaly, edible. Nat. from Eu. Summer.

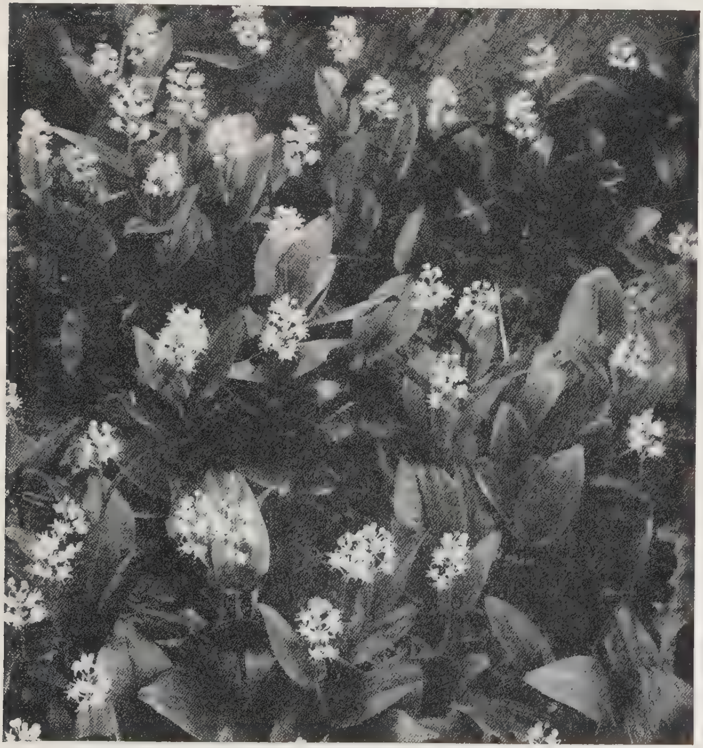


FIG. 7. WILD LILY-OF-THE-VALLEY (*Maianthemum canadense*)

10. SMILACINA Desf. False Solomon Seal

Perennials with creeping or thick rootstocks and simple stems, alternate-nerved leaves, and white, fragrant flowers; berry globular, 1-2-seeded, at first greenish or yellowish-white speckled with madder brown, finally dull ruby red.

Rootstock stout, fleshy; flowers on short pedicels in a terminal racemose panicle; stamens exceeding the small perianth, the segments 2 mm. long.......................... *S. racemosa* 1.

Rootstock slender; flowers on solitary pedicels, in a simple, few-flowered raceme; stamens shorter than the larger perianth segments, 4-5 mm. long.................. *S. stellata* 2.

1. **S. racemosa** (L.) Desf. 4-10 dm. tall, minutely downy; leaves numerous, oblong or oval-lanceolate, ciliate, abruptly petioled, taper-pointed. (*Vagnera* Morong.)—Thickets and dune woods, abundant throughout. June, July.

2. **S. stellata** (L.) Desf. 2-5 dm. tall, smooth or minutely downy on the 7-12 oblong-lanceolate leaves which are slightly clasping when young; raceme sessile, short. (*Vagnera* Morong.)—Less showy than the preceding but one of the characteristic plants on the inward facing slope of front dunes. July, August.

Smilacina trifolia (L.) Desf., a dwarf plant with peduncled raceme and only 2 or 3 leaves tapering to a sheathing base (otherwise as in *S. stellata*), has been reported from bogs near Pine but the report has not been verified and the stations are destroyed.

11. POLYGONATUM Hill. Solomon Seal

Perennials with knotted creeping rootstocks and simple stems bearing at their summits nearly sessile, half-clasping leaves and axillary, nodding, greenish flowers on jointed pedicels; perianth 6-lobed near the summit, cylindrical, the stamens inserted on or above the middle of the tube; berry globular, black or blue.

Leaves nearly sessile, minutely pubescent................ *P. biflorum* 1.

Leaves partly clasping, glabrous........................ *P. commutatum* 2.

1. **P. biflorum** (Walt.) Ell. Stem slender, 3-9 dm. tall; leaves pale or glaucous beneath, ovate-oblong or lance-oblong; peduncles 2-flowered or 1-3-flowered, the perianth 10-12 mm. long. (*Salomonia* Farwell.)—Occasional in rich woods and thickets. June.

2. **P. commutatum** (R. & S.) Dietr. Stem stout, 0.5-2 m. tall, the ovate leaves many-nerved; peduncles 2-8-flowered; flower 12-20 mm. long. (*Salomonia* Britton.)—Rather frequent in rich woods and thickets. June.

12. MEDEOLA L. Indian Cucumber

Perennial herbs rising from a white tuber, the stem simple, bearing near the middle a whorl of 5-9 leaves and another of 3-5 smaller ones near the top; flowers in a sessile umbel, the perianth recurved, small; style stigmatic down the inner side, recurved-diverging from the globose ovary; berry 3-celled, few-seeded.

1. **M. virginiana** L. 3-9 dm. tall, with flocculent deciduous wool on the stem; lower leaves obovate-lanceolate, smooth, dark green, the upper similar but ovate; perianth greenish yellow; style crimson, conspicuous; berry dark purple.—A curious little plant; the tubers are edible, having a starchy cucumbery taste; often giving rise to stolons which in turn produce tubers and these give rise to new plants.

Tamarack bogs, or Nyssa woods, from Liverpool (acc. to Clute) and Miller to Mineral Springs, and eastward. Formerly it grew near Whiting. June, July.

13. TRILLIUM L. Wake Robin

Low perennials with stout simple stems from a short tuber-like truncate rootstock; leaves normally of 3 simple, ribbed but net-veined blades, near the summit; flower solitary, large, terminal; sepals persistent, spreading, green; petals larger, withering in age; styles spreading, persistent, stigmatic down the inner side; ovary 3- or 6-celled; fruit a berry with several seeds in each cell.

Monstrosities in which any parts of the flower may resemble in whole or in part some other organs or may be turned into leaves are common, as are hybrids between the species. Color variations are also common, such as spotting or striping of petals, total or partial albinism and viridism, etc. It is rare to find a large patch of *Trillium* which does not exhibit some such peculiarities; even an extra number of petals or leaves is known. As specimens do not preserve the color of the flowers, notes should be made at the time of collection.

Flower sessile.
  Leaves sessile.. *T. sessile* 1.
  Leaves contracted at the base into a petiole............ *T. recurvatum* 2.
Flower pedicelled.
  Petals markedly recurved.
    Filaments equalling the anthers...................... *T. cernuum* 3.
    Filaments shorter than the anthers.................. *T. declinatum* 4.
  Petals not or but slightly recurved.................... *T. grandiflorum* 5.

1. **T. sessile** L. Stems 1-2 dm. tall; leaves oval or subrhombic, of one color or mottled with lighter shades of green, obtuse or acute, rounded at the base, often overlapping; petals purple, maroon, or brown; filaments dilated near the base; ovary dark, six-angled; berry black, broadly ovoid, 1-1.5 cm. long.—Rather frequent in rich woods and thickets throughout. May. The flowers have a crushed-strawberry odor, like *Calycanthus*.

2. **T. recurvatum** Beck. Stem 1.5-4.5 dm. tall; leaves ovate, oval, or oblong, 3.5-10 cm. long, sometimes mottled; petals dark purple, clawed; anthers much longer than the filaments, the connective prolonged beyond the sacs; berry ovoid, black, 6-winged above, about 2.5 cm. long.—In woods and thickets, occasional throughout. May, June.

3. **T. cernuum** L. var. **macranthum** Eames & Wiegand. Leaves very broadly rhombic-ovate; pedicels usually recurved below the leaves; petals white or pink, 1-1.7 cm. long, wavy; filaments nearly or quite equalling the anthers; ovary white or pinkish; stigmas stout; fruit ovoid, red.—In rich moist woods, Mineral Springs and eastward. May, June.

4. **T. declinatum** (Gray) Gleason. Leaves very broad, rhombic; peduncles horizontal, 4-7 dm. long; petals 2-3.5 cm. long, white; ovary white or pink with short stout tapering stigmas.—Low dune woods, rare, Tremont, and acc. to Lyon, Keiser.

5. **T. grandiflorum** (Michx.) Salisb. Leaves similar; pedicel erect; petals large, erect-spreading, reaching 7 cm. in length and 3.5 cm. in width, crisped, white or pink; stamens with stout filaments (persistently green about the fruit) and anthers exceeding the very slender or suberect stigmas; ovary small, white; fruit red.—A very beautiful fragrant species, extremely variable and given to producing anomalous and monstrous forms. In rich woods throughout. May, June.

14. SMILAX L. Brier. Carrion Flower

Shrubby vines or erect perennial herbs with ribbed and net-veined petioled leaves, with a pair of petiolar tendrils by which the plants climb; flowers in umbels on axillary peduncles, the sexes on separate plants; perianth regular, small, greenish yellow; fruit a small berry.

Stem woody, generally prickly; ovules 1 in each cell.	
Peduncles 4-10 mm. long, shorter or scarcely longer than the petioles; leaves thickish....................	*S. rotundifolia* 1.
Peduncles 2-4 times as long as the petioles; leaves thinnish.	*S. hispida* 2.
Stem herbaceous, not prickly; ovules 2 in each cell.	
Leaves 7-9-nerved; umbels 20-40-flowered...............	*S. herbacea* 3.
Leaves 5-7-nerved; umbels 10-20-flowered...............	*S. ecirrhata* 4.

1. **S. rotundifolia** L. (*Green Brier.*) Branches armed with stout scattered prickles; branchlets round or 4-angular; leaves round-ovate, often broader than long, abruptly sharp-pointed, slightly heart-shaped; berries blue-black with a bloom.—A stout-stemmed, high-climbing or long-trailing vine in thickets. May, June.

2. **S. hispida** Muhl. (*Cat Brier.*) Rootstocks cylindrical, elongated; stem below densely set with long weak black bristly prickles; leaves ovate, heart-shaped, rough-margined, pointed; branchlets cylindrical or nearly so; flowering branchlets scarcely prickly; peduncles 2-5 cm. long.—In thickets, Clarke, Pine, and eastward through the high dunes. May-July.

3. **S. herbacea** L. (*Carrion Flower.*) Stem climbing but not woody, 1-5 m. tall; leaves mostly heart-shaped or truncate at base, abruptly acute to short-acuminate, light shining green, smooth; peduncles 4-20 cm. long, often longer than the leaves; flowers with the odor of rotting flesh. (*Nemexia* Small.)—Common in moist meadows of the Calumet Region and more rarely eastward among the dunes. June, July.

Var. **pulverulenta** (Michx.) Gray. Leaves sparingly to densely pulverulent on the veins beneath.—Common in moist meadows of the high dunes.

4. **S. ecirrhata** (Engelm.) Wats. Erect, not climbing, similar to the preceding; tendrils none or present only above; lower leaves scale-like, the upper broadly ovate-elliptical, acute, cordate, 4-12 cm. long, pubescent beneath; peduncles and petioles 3-7 cm. long.—Rare, a prairie species, but found also in low woods back of the high dunes. Early spring.

BLOODWORT FAMILY (Haemodoraceae)

Perennial herbs with fibrous roots and perfect regular woolly or scurfy flowers, the tube of the 6-lobed perianth partly or wholly coherent with the 3-celled ovary; capsule crowned by the persistent perianth, 3-celled.

1. ALETRIS L. Colic Root

Smooth herbs, with all the leaves in a basal rosette; flowers small, in a spike-like raceme; perianth dingy white, papery, cylindrical, wrinkled and roughened outside; stamens 6, inserted at the base of the perianth lobes, included; style awl-shaped, 3-cleft at the apex, stigmas minutely 2-lobed; capsule beaked, seeds numerous. This genus is sometimes placed in the *Liliaceae* or *Amaryllidaceae* but seems best to fit in the *Haemodoraceae.*

1. **A. farinosa L.** Stem 4-10 dm. tall, smooth; leaves thin, flat, lanceolate; flowers tubular.—Grassy or sandy woods or meadows, frequent especially in meadows of the high dunes. July, August.

YAM FAMILY (Dioscoreaceae)

Twining vines with large tuberous roots or knotted rootstocks and ribbed and netted-veined, petioled leaves; flowers small, 6-merous, regular, the sexes on different plants; ovary inferior; styles 3, distinct; fruit a membranous 3-angled capsule.

1. DIOSCOREA L. Yam

Flowers very small, in axillary panicles or racemes; capsule 3-valved, splitting through the winged angles; seeds flat, membranous-winged.

1. **D. villosa L.** (*Wild Yam.*) Herbaceous, the rootstocks matted and knotty, the stems slender; leaves alternate or sometimes nearly opposite in fours, more or less downy beneath, heart-shaped, pointed, 9-11-ribbed; flowers greenish, the female in drooping simple racemes, the male in drooping panicles. (*D. paniculata* Michx.)—Occasional in the rich woods of Dune Creek, and in prairie thickets. The poisonous rootstocks are used in medicine, and the silvery pods are often collected for decoration. June.

AMARYLLIS FAMILY (Amaryllidaceae)

Bulbous plants, not climbing nor scurfy nor woolly, the leaves all radical, linear and flat, the flowers regular, perfect, 6-merous, the tube of the petal-like perianth adhering to the 3-celled ovary; style single; capsule 3-celled, several-seeded.

1. HYPOXIS L. Star Grass

Small herbs with grassy and hairy, linear leaves and slender few-flowered scapes; perianth spreading; fruit crowned with the withered perianth.

1. **H. hirsuta** (L.) Coville. Leaves grass-like, longer than the 1-flowered stem; perianth hairy and greenish outside, yellow or whitish inside.—Meadows, woods and sandy fields, frequent throughout. Spring.

IRIS FAMILY (Iridaceae)

Herbs with 2-ranked leaves enfolding each other, and folded lengthwise; flowers perfect, bursting from a spathe of 2 or more leaves or bracts, with 3 petals and 3 petal-like sepals, the calyx tube adhering to the 3-celled ovary; stamens 3; style single, 3-cleft, with 3 or 6 stigmas; fruit a 3-celled loculicidal capsule with many seeds.

Rootstocks tuberous; branches of the style or petal-like stigmas opposite the anthers......................	*Iris* 1.
Roots fibrous, no rootstocks; branches of the style alternate with the anthers, stigmas not petal-like.............	*Sisyrinchium* 2.

1. IRIS L. Iris

Perennials; rootstocks creeping; leaves grassy or sword-like; tube of the flower prolonged beyond the ovary; sepals recurved; petals erect or spreading; styles branching out and arching, of the color and texture of the petals; stigmas borne as thin plates under the apex of the 3 branches of the style which is united at base with the petals and sepals to form a tube; fruit a 3-6-angled leathery capsule.

1. **I. versicolor** L. (*Blue Flag.*) Stem 1.5-9 dm. tall, stout and angled on one side but rounded on the others; leaves sword-like, glaucous; flowers 5-8 cm. long, short-pedicelled, blue with yellow and white near the center; fruit stout-beaked, firm, with rounded angles.—A beautiful plant of wet grassy land or shallow water, locally abundant in ponds and swales of the high dune region, and frequent around Wolf Lake and in the waterways of the Calumet District. May, June.

2. SISYRINCHIUM L. Blue-eyed Grass

Low slender perennials with grassy leaves and 2-edged or winged stems and ephemeral flowers in an umbel, from a usually 2-winged spathe; sepals and petals alike, spreading; capsule globular, 3-angled; seeds globular.

Spathes sessile and terminal............................	*S. albidum* 1.
Spathes peduncled from the axil of the leaf-like bract.	
Stems slender and narrowly margined; inner bract of spathe 1-1.5 cm. long................................	*S. atlanticum* 4.

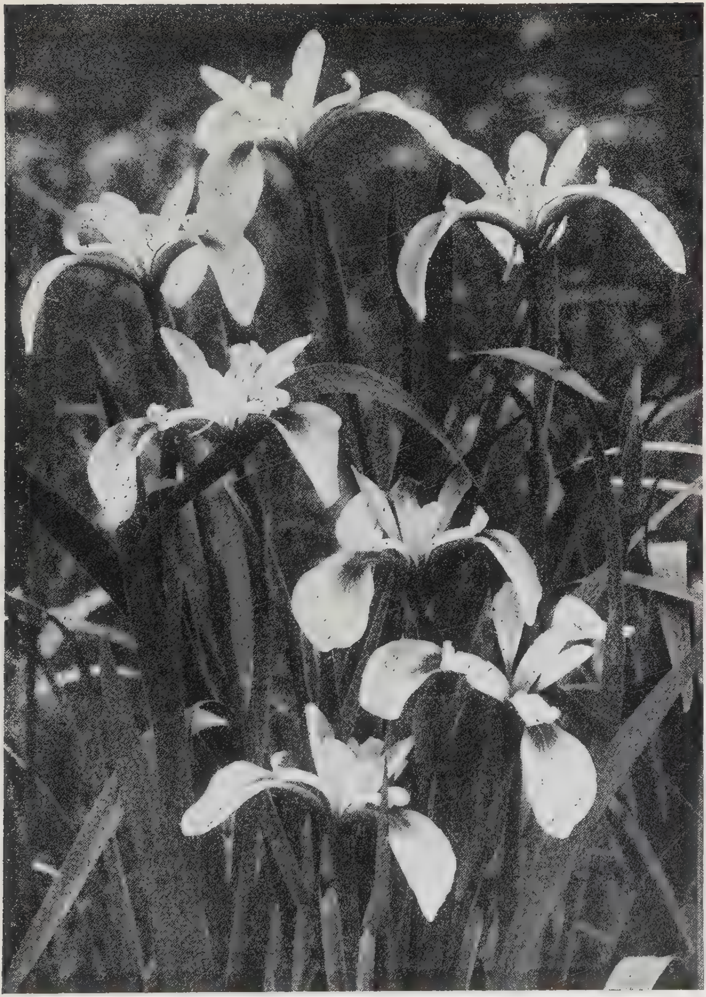


FIG. 8. BLUE FLAG (*Iris versicolor*)

Stems broadly winged; inner bract of spathe 1.5-3 cm. long.
  Pedicels loosely spreading, much exceeding the inner bract.................................... *S. gramineum* 3.
  Pedicels strongly ascending, rarely exceeding the inner bract.................................... *S. angustifolium* 2.

1. S. albidum Raf. Plant 1.5-4.5 dm. tall, pale green; stems twice as long as the flat leaves, 1-3 mm. wide; spathes with slender purplish inner bract one-half as long as the erect outer bract; flowers about 1 cm. long, white or violet; capsule pale straw-color, subglobose, 2.5-4 mm. high. (*S. versicolor*, Bicknell.)—In moist sands, Dune Park and perhaps elsewhere, a prairie species. May, June.

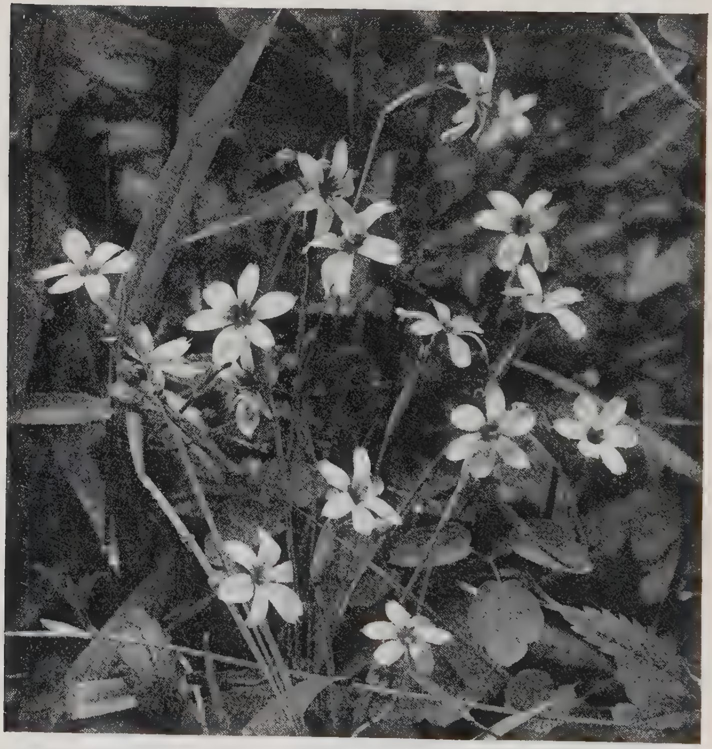


FIG. 9. BLUE-EYED GRASS (*Sisyrinchium angustifolium*)

2. S. angustifolium Mill. Stiff, glaucous, 1-5 dm. tall; stems 1.5-3 mm. broad, winged, exceeding the narrow leaves; outer spathe bract with the margins united near the base, twice as long as the inner;

flowers violet or white; capsules dull brown or purplish.—Damp sandy soil, meadows and fields on the prairies of the Calumet District. May-July.

3. **S. gramineum** Curtis. Loosely tufted, bright green or glaucous, 1.5 dm. tall; stems flat, broad-winged, 2-6 mm. wide, flexuous or bent, mostly taller than the very grassy leaves; spathes 1.5-2 cm. long, the outer bracts slightly longer; flowers blue; capsules 4-6 mm. high, subglobose. (*S. anceps* A. Gray; *S. graminoides* Bicknell.)—Meadows, woods and prairies, throughout. May, June.

4. **S. atlanticum** Bicknell. Loosely tufted, pale and glaucous, 2-7 dm. tall; stems slender, wiry, flexuous or bent, narrowly margined, much longer than the narrow leaves; spathes oblique, tinged with pink, outer bracts acute, inner bracts obtuse and nearly as long; flowers violet; capsules slightly longer than thick, 3-4.5 mm. tall. (*S. apiculatum* Bicknell.)—A rare and pretty plant, wet swales, Tremont and elsewhere back of the high dunes. A coastal plain species. August.

ORCHID FAMILY (Orchidaceae)

Herbs with corms, tubers or fibrous roots and bracted irregular flowers with the perianth adhering to the 1-celled many-ovuled ovary. Sepals 3, often similar in texture to the 3 petals; one petal generally distinctly different from the others, and appearing as a variously shaped lip at the base of which is the column composed of 1 (or rarely 2) stamens cohering with the style which terminates in a sticky or rarely roughened stigma. Anthers containing masses of pollen (pollinia), or the pollen rough-granular. A family dependent, by many complicated contrivances, on insects for pollination. The seeds are generally minute.

- Plants yellowish, purplish or dingy, destitute of chlorophyll.. *Corallorrhiza* 10.
- Plants green.
  - Lip an inflated sac (as in lady's-slipper)................ *Cypripedium* 1.
  - Lip not an inflated sac, or only slightly saccate at base.
    - Flowers with a distinct slender spur................. *Orchis* 2.
    - Flowers without a conspicuous spur.
      - Perianth at least 15 mm. across.
        - Leaves linear to linear-lanceolate, sheathing the base of the stem.
          - Flowers several, inverted, with one floral bract.. *Calopogon* 4.
          - Flowers solitary, not inverted, with 2 floral bracts. *Arethusa* 5.
        - Leaves ovate to lance-oval..................... *Pogonia* 3.
      - Perianth less than 15 mm. across.
        - Petals jointed to the upper sepal.
          - Lip slightly saccate and without calluses at base; leaves variegated................ *Peramium* 8.
          - Lip not saccate, with horn-like callus on each side at base; leaves not variegated....... *Spiranthes* 6.
        - Petals and sepals free.
          - Leaf solitary................................ *Microstylis* 9.
          - Leaves two................................ *Liparis* 7.

1. CYPRIPEDIUM L. Lady's-slipper

Roots coarsely fibrous; leaves sheathing at the base, many-nerved, plaited. The flowers are unlike others of our genera in having 2 fertile stamens with a rudiment of a third and the pollen grains rough-granular instead of waxy and coherent, the stigma rough instead of viscid, and the lip extended into a deep sac (called commonly a "slipper"). Sepals spreading, all three distinct or generally two of them united below under the sac; petals spreading, linear or oblong; column declined; the sterile stamen resembles a petal; stigma terminal, obscurely 3-lobed.

Showy-flowered plants mostly pollinated by bees which get inside the sac and can not get out by the way they have entered and so have to pass out by the openings at the base, in doing which they brush against the stigma and then the anthers.

- Leaves all radical; stems with a single, 1-bracted flower; lip fissured in front.................................. *C. acaule* 1.
- Stems leafy; flowers 1-3; lip not fissured.
  - Sepals and petals twisted, longer than the lip.
    - Lip white.. *C. candidum* 3.
    - Lip yellow....................................... *C. parviflorum* 2.
  - Sepals and petals not twisted, shorter than the lip........ *C. reginae* 4.

1. **C. acaule** Ait. (*Moccasin Flower, Pink Lady's-slipper.*) Leaves 2, oval; stem 15-38 cm. high; sepals and petals brownish green; lip obovoid, sagging and elongate, veiny, 5 cm. long, crimson pink with darker veins, or rarely white. (*Fissipes* Small.)—Dry pine woods, or, in our region, more often in acid bogs. Clarke to Mineral Springs and rarely eastward. May, June.

2. **C. parviflorum** Salisb. (*Yellow Lady's-slipper.*) Stem 2-6 dm. tall; leaves oval; sepals and petals greenish purple, 3-5 cm. long; lip 2-3 cm. long. (*C. hirsutum* of auths., not Mill.; *C. pubescens* Sweet.)—In bogs, from Clarke and Pine to Liverpool and Mineral Springs. May-July.

Var. **pubescens** (Willd.) Knight. More robust; lip 3.5-5 cm. long. —Range of the species.

3. **C. candidum** Willd. (*White Lady's-slipper.*) Stem 16-28 cm. tall, one-flowered; leaves crowded, oval-lanceolate; petals and sepals green, spotted with purple; lip 18-20 mm. long, striped with purple at the base inside.—In the tamarack bog at Mineral Springs; also reported from Pine. The station at Whiting appears to be destroyed. May, June.

4. **C. reginae** Walt. (*Showy Lady's-slipper.*) Stem 4-8 dm. tall, hirsute; leaves ovate, acute; petals white, shorter than the sepals; lip much distended, bright white, suffused with purple, 4 cm. long. (*C. spectabile* Salisb.; *C. hirsutum* Mill.)—A splendid flower, becoming rare, due to picking. In tamarack bogs at Mineral Springs, in wet hollows, Gary, East Gary, Liverpool, Dune Park and Pine. The Whiting station is probably destroyed. June-September.

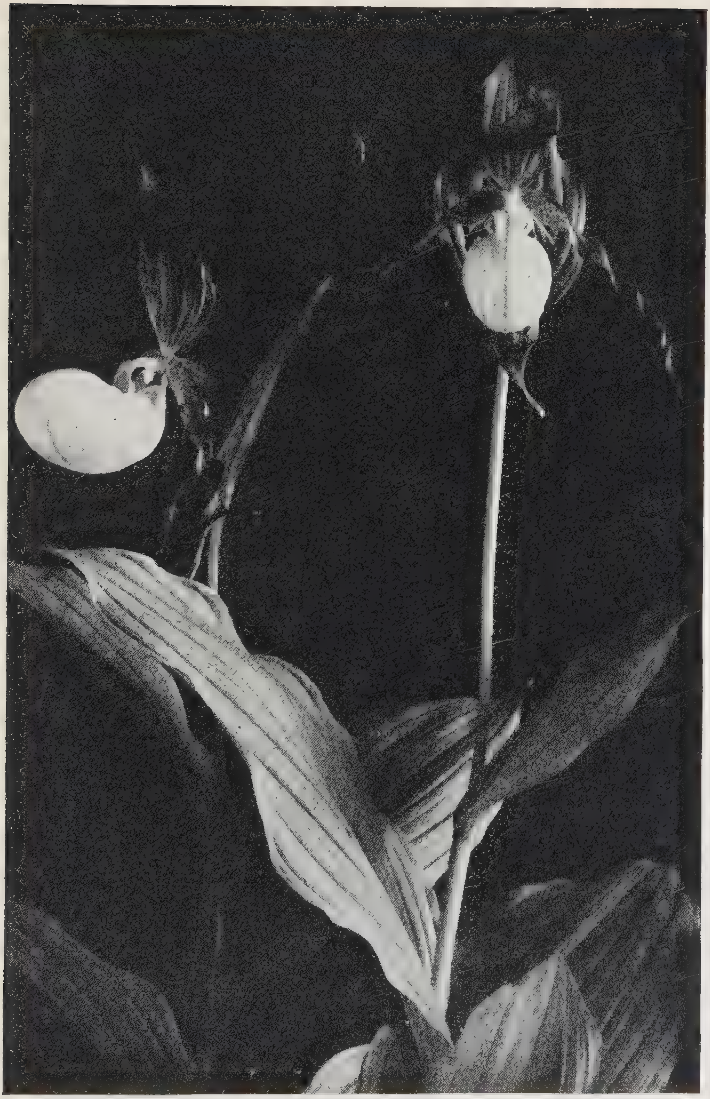


FIG. 10. YELLOW LADY'S-SLIPPER (*Cypripedium parviflorum*)

2. ORCHIS L. Orchis

Smooth plants with elongated, fleshy-thickened, tuber-like roots and racemose flowers with spreading sepals, and erect petals converging with the upper sepal; lip deflexed; pollinia prolonged at the base of anthers into filaments or caudicles which are attached to sticky disks or glands, these sometimes (as in the first species) contained in a pouch.

A genus from which many genera are sometimes artificially segregated, most commonly *Habenaria.* "An insect entering the flower probes the spur of the labellum and its back comes into contact with the rostellum and depresses the pouch, causing the viscid substance to adhere to the insect."

Lip not fringed, though often lobed or toothed.
  Stems leafy.
    Leaves on the stem 3 or more.
      Lip lobed or toothed.
        Lip 3-toothed at the apex........................ *O. bracteata* 2.
        Lip hastate, with a tubercle at the base........... *O. flava* 3.
      Lip entire, lanceolate............................ *O. hyperborea* 4.
    Leaves of the stem 1 or 2.......................... *O. clavellata* 5.
  Stems naked, leaves all radical.
    Flowers purplish blue, with white lip................ *O. spectabilis* 1.
    Flowers greenish white............................ *O. Hookeriana* 6.
Lip fringed, sometimes also divided.
  Lip undivided.. *O. ciliaris* 7.
  Lip divided.
    Petals entire....................................... *O. lacera* 8.
    Petals minutely toothed.
      Flowers greenish or whitish........................ *O. leucophaea* 9.
      Flowers purplish................................... *O. psychodes* 10.

1. **O. spectabilis** L. (*Showy Orchis.*) Low, with two shining oblong-obovate leaves, the stem leafless, 4-17 cm. high, 4-5-angled; bracts leaf-like, the floral exceeding the flowers; sepals and petals continuous, forming an arched hood behind the column; lip ovate, white, undivided, the rest of the perianth violet-blue. (*Galeorchis* Rydb.)—Rare, in rich dune woods. May, June.

2. **O. bracteata** Willd. Stem 1.5-6 cm. tall, stout; floral bracts 2-3 times the length of the green flowers; raceme 10-30-flowered; petals linear, lip more than 2 times the length of the whitish spur. (*Habenaria* R. Br.; *Coeloglossum* Parl.)–Rare, wooded dunes, Tremont; pine woods at Miller and Pine. May-September.

3. **O. flava** L. var. **virescens** Greene. (*Rein Orchis.*) Stems 25-55 cm. tall; leaves passing into the bracts of the elongated raceme; petals greenish; lip a little longer than the petals. (*Habenaria* Gray, *Perularia* Farwell.)—On the sand plains around Pine and Clarke; infrequent in wet places, dune meadows, Keiser, acc. to Lyon. June, July.

4. **O. hyperborea** L. (*Iceland Orchis.*) 1.5-10 cm. tall; leaves long, acute; flowers greenish or greenish-yellow; lip incurved; spur short. (*Habenaria* R. Br.; *Limnorchis* Rydb.)—A species variable in

height, width of leaves, and relative lengths of spur and lips, and size of flowers. Very rare, in bogs, at Dune Park, Miller and Pine, also near Gary, acc. to Macbride, and in tamarack woods, Mineral Springs, acc. to Lyon.

5. **O. clavellata** Michx. (*Frog Spike.*) Stem slender, 19-40 cm. tall; raceme 3-16-flowered, subcylindric; flowers greenish white; lip wedge-oblong, truncate, with 3 short apical lobes; spur slender, curved upwards. (*Habenaria* Spreng.; *Gymnadeniopsis* Rydb.)—Moist grassy swales and along sloughs, Clarke and Pine to Miller. Also low rich dune woods, Tremont. A northern species. June-August.

6. **O. Hookeriana** (Gray) Oakes. Stem 12-16 cm. tall, not bracted; leaves orbicular or elliptical, near the ground, 3.5-10 cm. broad; raceme with 18-20 yellowish green flowers; lip lanceolate, 1 cm. long, spur slender, acute, 2 cm. long. (*Lysias* Rydb.; *Habenaria* Torr.)—Wet woods, Miller to Michigan City, also formerly at Indiana Harbor. June, July.

7. **O. ciliaris** L. (*Yellow Fringed Orchis.*) Stem 4-6 dm. tall; leaves linear-oblong, passing above into the bracts of the raceme which is 4-6 cm. thick; flowers orange-yellow, lip oblong, 1 cm. long, the basal segments often branched; spur 2-2.5 cm. long. (*Habenaria* R. Br., *Blephariglottis* Rydb.)—A frequent and brilliant-flowered orchid of ditches and mucky places, Tremont, Miller, Dune Park, etc. July, August.

8. **O. lacera** Michx. (*Ragged Fringed Orchis.*) 3-6 dm. tall; leaves oblong or lanceolate; raceme many-flowered; divisions of the lip narrow, incised, the segments capillary; spur 1.5 cm. long. (*Habenaria* R. Br.; *Blephariglottis* Farwell.)—In low moist sandy ground or wet grassy meadows, Aetna, eastward among the dunes. June-August.

9. **O. leucophaea** Nutt. (*White Orchis.*) Stem 6-15 dm. tall stoutish; leaves oblong-lanceolate; raceme loose, long, the handsome pallid flowers fragrant, their petals obovate and the lip segment cut deeply into copious fringe; spur 3.5 cm. long. (*Habenaria* Gray; *Blephariglottis* Farwell.)—Rare, in low meadows bordering Deep River, near Gary. Acc. to Macbride probably in danger of immediate extermination. July, August.

10. **O. psychodes** L. (*Purple Fringed Orchis.*) 5 dm. tall; lower leaves 2-4, oval to oblanceolate, passing into the linear-lanceolate bracts; raceme 3-3.5 cm. in diameter, densely flowered; petals more or less denticulate; lip 3-parted, 1-1.2 cm. broad, the spreading divisions fringed mostly less than ⅓ their length; spur about 1 cm. long. (*Habenaria* Sw., *Blephariglottis* Rydb.)—A very brilliant and beautiful orchid, growing around sloughs and in thickets, Miller, Dune Park, Tremont, etc. July, August.

3. POGONIA Juss. Snake's Tongue

Low herbs with terminal flowers, the leaves in our species alternate; sepals and petals separate, ascending, lip papillose-crested, erect from the base of the column which is elongated and club-shaped at the summit; capsule oblong or ovoid.

Lip not lobed, merely lacerate-toothed.................... *P. ophioglossoides* 1.
Lip three-lobed, merely fimbriate-margined................ *P. trianthophora* 2.

1. **P. ophioglossoides** (L.) Ker. Plants 1-3 dm. tall, glabrous, bearing a single oval or lance-oval leaf near the middle and a bract below the large solitary terminal flower which is rose-colored or rarely white; lip spatulate, with a white or yellow crest.—A showy and beautiful plant of wet grass land and bogs of the Calumet District. June, July.

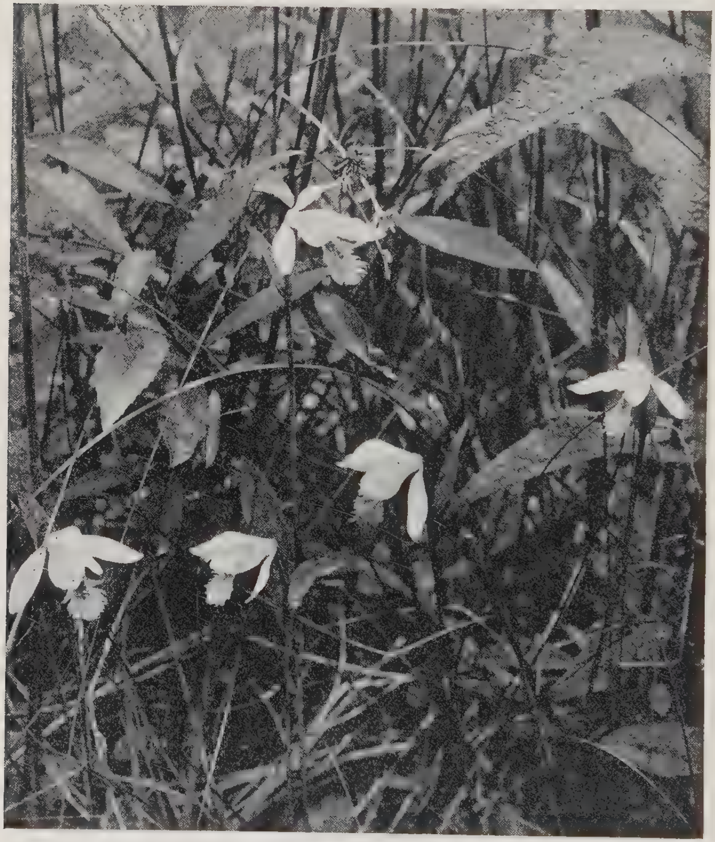


FIG. 11. SNAKE'S TONGUE (*Pogonia ophioglossoides*)

2. **P. trianthophora** (Sw.) BSP. Plants 3-20 cm. tall, slender and delicate; leaves 1-4, broadly ovate, small; flowers ephemeral, several drooping together, small, pale purple. (*Triphora pendula* Nutt.)—Rare, in woods at Tremont, Pine and Miller. August.

4. CALOPOGON R. Br. Grass Pink

Leafless stem from a solid bulb, sheathed below by the grass-like leaves; flowers in a loose raceme; sepals and petals distinct, lip dilated and bearded.

1. **C. pulchellus** (Sw.) R. Br. Plants 15-40 cm. tall; raceme 4-12-flowered; flowers crimson or rarely white; petals constricted near the middle; lip with yellow or magenta-crimson hairs. (*Limodorum tuberosum* of auths., not L; *Cathea* Salisb.)—Bogs and wet meadows, back of the high dunes and in the Calumet District. July, August.

5. ARETHUSA L. Arethusa

Bulb solid, white or greenish; stem smooth; leaf solitary, linear, nerved, hidden in stem sheath, appearing after the flowers open; flowers two-lipped, sepals and petals similar, arching over the column, united at base; lip partly erect, abruptly recurved; column adherent to the lip, petal-like, dilated; pollen masses granular and powdery.

1. **A. bulbosa** L. 10-25 dm. tall; flowers generally solitary, magenta-pink or white, 2.5-5 cm. long; lip oblong, narrowed at the base, with 3-5 yellow or white fringed crests, the lip margin spotted and streaked with magenta-crimson, fringed; stigma turned downward, protruding.—A pretty little plant, on bogs and in wet swales, Pine, Miller and Liverpool, rare. May, June.

6. SPIRANTHES Richard. Ladies' Tresses

Roots clustered; stem bracted above, leaf-bearing below; flowers small, in a spirally twisted raceme; perianth 2-lipped; upper sepal united with the oblong petals; lip short-stalked, dilated, recurved, wavy or toothed, with a callus on each side; foot of the short column bearing the ovate stigma; pollen masses narrowly ovoid, 2-cleft, split into delicate plates of granular pollen united by elastic threads.

Flowers in a single rank around the spiral raceme..........	*S. gracilis* 1.
Flowers in 2-3 ranks around the spiral raceme.............	*S. cernua* 2.

1. **S. gracilis** (Bigel.) Beck. Plants from clustered roots, slender, 2-8 dm. tall; raceme slender, many-flowered; lip greenish with a crisped white margin; leaves disappearing at flowering time. (*Ibidium* House; *Gyrostachys* Kuntze.)—In dry pine lands of the Pine district, and rare at Mineral Springs. July-September.

2. **S. cernua** (L.) Richard. 15-40 cm. tall, from slender fleshy roots; stem bract-leaves 4 or 5, closely appressed, the floral bracts exceeding the ovaries; racemes 3-12 cm. long; lip ovate-oblong, the

margin crisped; leaves mostly radical, often disappearing at flowering time. (*Ibidium* House; *Gyrostachys* Kuntze; *S. odorata* Lindl.)—Common in meadows and on prairies throughout. September, October.

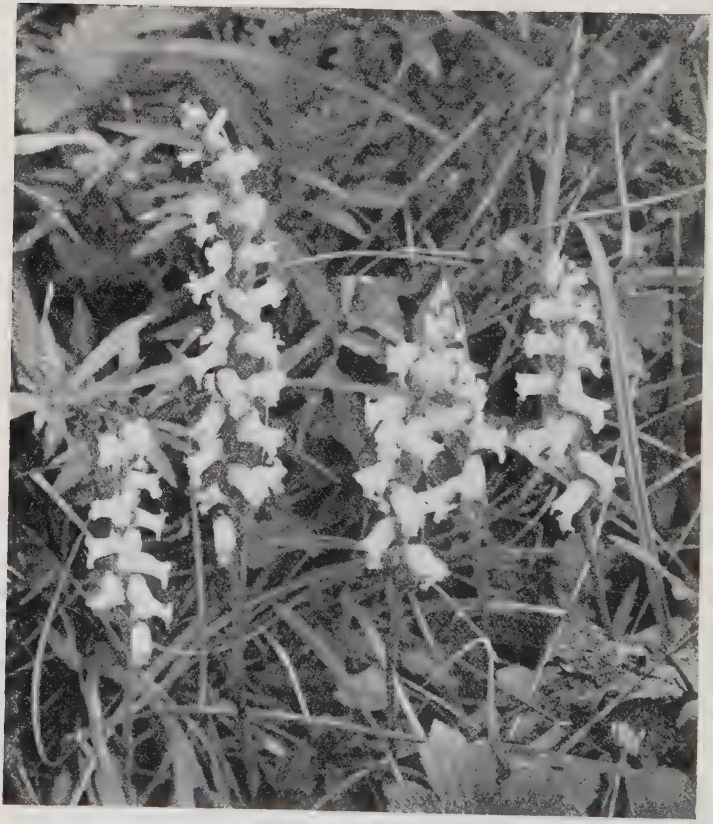


FIG. 12. LADIES' TRESSES (*Spiranthes cernua*)

7. LIPARIS Richard. Tway-blade

Low plants from solid bulbs, producing 2 root leaves and naked stems; racemes few-flowered; sepals oblong-lanceolate; petals linear; lip entire; column stout at base, curved, winged above; pollen masses slightly united in pairs, without stalks.

Lip wedge-obovate, madder purple...................... *L. liliifolia* 1.
Lip obovate or oblong, yellowish green.................. *L. Loeselii* 2.

1. **L. liliifolia** (L.) Richard. 10-17 cm. tall; leaves elliptic or ovate, glossy; stem angled; flowers 5-15; petals pendent, madder-purple. (*Malaxis* Sw.)—Rare in woods, Pine, and, acc. to Hellmayr, Gary. June, July.

2. **L. Loeselii** (L.) Richard. 8-22 cm. tall; leaves oblong or elliptic-lanceolate, keeled; lip oblong or obovate, 5 mm. long. (*Malaxis* Sw.)—Swamps, damp grass, and edges of sloughs, Pine and East Chicago, eastward on tamarack bogs to Michigan City. June, July.

8. PERAMIUM Salisb. Rattlesnake Plantain

Roots thick and fibrous from a somewhat fleshy creeping rootstock. Leaves all basal, dark green and cross-veined with white. Stem and raceme and flowers whitish-downy. Lip saccate, without callosities; upper sepal and the petals united into a hood over the lip; anthers borne on the back of the short column; pollen masses 2, attached by a narrow gland which is held between the forked beak terminating the column.

1. **P. pubescens** (Willd.) MacM. Stem 1.5-4 dm. tall, stout; leaves ovate-lanceolate, dark green with 5-7 white nerves and many fine white veinlets; raceme densely many-flowered; lip strongly saccate with a short blunt tip, globose. (*Goodyera* R. Br., *Epipactis* A. A. Eaton.)—Pine woods, in sand, Miller, Whiting, Tremont, acc. to Lyon. Rare. August, September.

9. MICROSTYLIS (Nutt.) Eaton. Adder's Mouth

Low herbs; bulbs solid; stems simple, 1-leaved; flowers minute, greenish, in racemes; sepals spreading as are the thread-like petals; lip practically entire, ovate at base, narrowed above.

1. **M. monophyllos** (L.) Lindl. 10-15 cm. tall, slender; leaf ovate-elliptical, sheathing; pedicels as long as the ovaries; lip long-pointed. (*Malaxis* Sw.)—In a tamarack bog near Dune Park, acc. to Pepoon. June, July.

10. CORALLORRHIZA R. Br. Coral Root

Yellowish, brownish, or pinkish small plants without chlorophyll, living saprophytically, and having coral-like underground rootless stems; scapes solitary, devoid of leaves, scaly; flowers in racemes; sepals and petals similar, long and narrow, the lateral sepals forming with the lip a short spur which is adherent to the ovary; fruit reflexed.

Slender, 4-12-flowered; lip white, unspotted.............. *C. trifida* 1.
Stout, 10-20-flowered; lip white, purple-spotted........... *C. maculata* 2.

1. **C. trifida** Chatelain. 4-20 cm. tall, yellowish; perianth 5 mm. long; lip hastately 3-lobed; spur very short. (*C. Corallorrhiza* Karst.; *Neottia Corallorrhiza* Kuntze.)—Low wet dune woods, east of Dune Park, and acc. to Pepoon, found, at least formerly, at Clarke and Berry Lake. May-July.

2. **C. maculata** Raf. 2-4 dm. tall, purple or yellowish; perianth 5-20 mm. long; lip deeply 3-lobed, the middle lobe squarish. (*C. multiflora* Nutt.)—Steep wooded hillsides, Mount Tom, above Dune Creek, rare, probably also in dune woods eastward to Michigan. Formerly at Berry Lake. July, August.

LIZARD'S-TAIL FAMILY (Saururaceae)

Perennial herbs with broad, entire, alternate, petioled leaves and small perfect bracteolate flowers in peduncled spikes; petals and sepals none; stamens 6-8 or fewer; ovary of 3-4 carpels; fruit capsular.

1. SAURURUS L. Lizard's-tail

Rootstocks slender; stems jointed; leaves heart-shaped; petioles sheathing the stem at the nodes; flowers small, in 1 or 2 elongated and dense spikes or catkins which are opposite the leaves; fruit rugose, depressed-globose, separating into 3-4 carpels, each 1-seeded.

1. **S. cernuus** L. Stem slender, mostly not branched, 0.5-1.5 m. tall; leaves palmately 5-9-ribbed, dark green; flowers white, the spikes drooping at the tip; stamens white, spreading; fruit slightly fleshy.—A pretty and fragrant flower, common in Dune Creek; occasional elsewhere in slow streams and ponds. July, August.

PLANE TREE FAMILY (Platanaceae)

Trees with alternate, palmately lobed leaves, sheathing stipules and dense globose heads of flowers, all of one sex; calyx and corolla none; stamens numerous; ovaries inversely pyramidal, mixed with little scales; fruit club-shaped, a 1-seeded nutlet furnished with a ring of bristly hairs around the base.

1. PLATANUS L. Plane Tree

Large trees with light bark deciduous in thin brittle plates; flowers small, greenish; filaments short, intermixed with little club-shaped scales; styles lateral; nutlets leathery, tawny-hairy below.

1. **P. occidentalis** L. (*Sycamore, Buttonwood.*) Bark gray below, grayish green above, splotched with white; twigs zigzag, soon glabrous except a ring of hair below the leaf scar; base of petiole sheathing axillary buds; leaves broadly ovate, palmately 3-5-lobed and veined, soon glabrous except the veins beneath; flowers and leaves appearing together; peduncles drooping, woolly.—Sometimes an enormous tree in height, spread, and diameter, with soft pale light wood; flowers in May. The woolly fruiting heads turn red, then silvery, and finally blow away like a dandelion head. Infrequent in our area except along Dune Creek, and banks of the Little Calumet.

BAYBERRY FAMILY (Myricaceae)

Aromatic and resinous shrubs with simple, alternate, thick leaves. Flowers in catkins, the sexes on the same or different plants, but not in the same flower; sepals and petals none, but a bract subtending each flower. Male flower with 4-8 (2-16) stamens; female flowers with one ovary subtended by 2-8 bractlets; fruit a small nut, the outer shell waxy.

1. MYRICA L. Bayberry. Sweet Gale

Flower solitary under a scaly bract and with a pair of bractlets; male flowers in ellipsoid, female in ovoid, catkins from axillary scaly buds; stamens 2-8, with the filaments united below; fruit dry, globular.

1. **M. asplenifolia** L. (*Sweet Fern.*) Shrubby, 3-6 dm. tall, with brown branchlets, the leaves fern-like, pinnatifid with many rounded lobes, aromatic; stipules half-heart-shaped; flowers of both sexes generally present on the same plant; nut ovoid-cylindric, brown, surrounded by pine-like, persistent bractlets of the ovary. (*M. peregrina* Kuntze; *Comptonia asplenifolia* Gaertn.; *C. peregrina* Coulter.)—Found in sterile soil, especially that poor in nitrogen. Rare in a meadow at Keiser acc. to Lyon, and more extensively found in dry poor soils of the Calumet District, from Griffith northward locally to Lake Michigan. May.

WILLOW FAMILY (Salicaceae)

Trees or shrubs with simple, alternate leaves and scale-like deciduous or leaf-like persistent stipules; bark bitter; wood soft and light; flowers in catkins, the sexes on separate plants; flowers without perianth but accompanied by a scale or bract; fruit a 1-celled pod with numerous silky-hairy seeds.

Winter buds with many overlapping scales; catkins flexuous and drooping; scales of the catkins fringed or toothed; nectariferous glands none; base of the ovary wrapped by an irregular cup or disk (probably a rudimentary calyx); stamens numerous; stigmas long........... *Populus* 1.

Winter buds with a single scale with inrolled edges; catkins straight and ascending; scales of the catkin entire or merely toothed; nectariferous gland between the base of each flower and the axis of the catkin; no cup at the base of the ovary; stamens 2, rarely 3, 5 or 8; stigmas short... *Salix* 2.

1. POPULUS L. Poplar

Trees with often angular, thick branchlets, and more or less heart-shaped or ovate leaves; stamens 8-30 or more; stigmas 2-4; capsule 2-4-valved; buds scaly, covered with a resinous varnish. The flowers are wind-pollinated.

Terminal buds small, slightly resinous; style lobes narrow; capsules small and thin (the aspens).
  Mature leaves silvery-tomentose beneath............... *P. alba* 1.
  Mature leaves smooth.
    Leaves finely serrate; winter buds smooth............. *P. tremuloides* 2.
    Leaves coarsely serrate; winter buds tomentose........ *P. grandidentata* 3.

Terminal buds large, sticky; style lobes thick; capsules large and thick (the cottonwoods).
  Petioles practically round in cross-section.
    Capsule thick-pedicelled; young leaves smooth......... *P. balsamifera* 5.
    Capsule slender-pedicelled; young leaves white-tomentose *P. heterophylla* 6.
  Petioles flattened................................ *P. deltoides* 4.

1. **P. alba** L. (*White* or *Silver Poplar.*) A white- or grayish-barked tree with the young branches white-tomentose; leaves acute, rhombic-oval, sinuate-toothed.—A common ornamental tree, much planted and often escaping cultivation in our area, especially around towns and farms; it suckers extensively from the base, sending up small shoots. Intr. from Eu. Spring.

2. **P. tremuloides** Michx. (*Quaking Aspen.*) 7-20 m. tall; trunk dark gray; branches remote, slender, pendulous at the ends; bark of the twigs pale yellow-brown or orange-green; leaves ovate to acuminate or abruptly short-pointed, closely serrulate with glandular teeth, green and shining above, downy only when young; scales cut into 3 or 4 deep linear divisions and fringed with long hairs; catkins 6 cm. long.—A beautiful tree, noted for its rustling leaves; one of the first trees to reforest a burned-over area. In our region it is rather common in thickets of the Calumet District and back of the dunes, but it is not common on the true dunes themselves, nor on the beach of Lake Michigan. Spring.

3. **P. grandidentata** Michx. (*Large-toothed Aspen.*) Old bark gray, fissured, young light greenish brown; twigs stout, large, reddish brown, shining; leaves ovate, pointed, coarsely and irregularly toothed or on young shoots larger and very small-toothed, at first downy, at length smooth, shining, those of the young shoots permanently velvety beneath; scales long-hairy, irregularly lobed at the apex; catkins 10 cm. long.—A fine tree with clear gold autumnal foliage; in thickets back of the high dunes, only locally common. Spring.

4. **P. deltoides** Marsh. (*Cottonwood.*) Crown broadly spreading; old bark fissured, with rounded ridges, gray; young twigs stout, smooth, yellowish green and shining, becoming gray; leaves broadly triangular-ovate, rather finely and bluntly toothed, pointed, when young sparingly hairy, eventually smooth, shining above, paler beneath, bases distinctly truncate, giving the leaves their characteristic triangular appearance; scales fringed; catkins 7-12 cm. long. (*P. monilifera Ait.*)—A rapidly growing tree, the commonest tree of the lake shore and the newest dunes. Spring.

5. **P. balsamifera** L. (*Balsam Poplar, Tacamahac.*) Very tall narrowly pyramidal tree with bark ultimately rugged, and large varnished buds with fragrant resin; leaves cordate-ovate to ovate-lanceolate, finely crenate, tapering, pointed, smooth on both sides, but beneath veiny and silvery; stamens 20-30; capsule 2-valved, ovoid. (*P. Tacamahacca* Mill.; *P. canadensis* Moench.)—Reported by Pepoon from East Gary; it is perhaps not now found in our area.

6. **P. heterophylla** L. (*Downy Poplar, Swamp Poplar.*) Irregularly branching; leaves cordate or truncate at base, obtuse, crenate,

ovate; male catkins short, female few-flowered; stamens 12-60; capsule as long as the pedicels.—Swamp near Port Chester. This southern coastal plain poplar was found by Pepoon, Cowles, Umbach and Schantz, acc. to Pepoon, who believes it is rapidly vanishing. Single trees reported from Miller and Pine.

2. SALIX L. Willow. Osier

Trees or shrubs with round and limber twigs and mostly long-petioled, long and pointed leaves; male flowers of 2, or rarely 3-10 stamens, these more or less united or distinct, and accompanied by 1 or 2 small glands; the female flowers with a small flat gland near the base of the ovary; style short or obsolete, stigmas short. Each flower is subtended by a scale.

This genus is one of the commonest in our region, both species and individuals being numerous in practically all the habitats of the area. Since the sexes are on different plants and the young leaves are much unlike the mature ones, it is a very difficult group to identify. For this reason and because of its importance in ecological classification there have been provided the three following keys as well as rather complete descriptions of the species.

KEY TO FEMALE FLOWERS, YOUNG LEAVES, ETC.

- Flowers appearing after the leaves........ *S. interior* 5.
- Flowers appearing with or before the leaves.
  - Flowers appearing before the leaves.
    - Flower-scales yellow........ *S. Bebbiana* 11.
    - Flower-scales brown or black, at least at the tip.
      - Scales white-woolly........ *S. candida* 9.
      - Scales pubescent with long, gray, twisted hairs........ *S. glaucophylla* 6.
      - Scales variously pubescent but not as above.
        - Catkins not crowded, 2-4 cm. (or at maturity 4-8 cm.) long; twigs black or dark purple........ *S. discolor* 12.
        - Catkins crowded; twigs brown.
          - Catkins 1.5-3 cm. long; tall shrub........ *S. humilis* 13.
          - Catkins 1-1.5 cm. long; low shrub........ *S. tristis* 14.
  - Flowers appearing with the leaves.
    - Scales yellow.
      - Scales persistent........ *S. Bebbiana* 11.
      - Scales deciduous.
        - Young leaves wholly glabrous........ *S. fragilis* 4.
        - Young leaves at least somewhat pubescent.
          - Young leaves covered with crisp, ruddy hairs........ *S. lucida* 3.
          - Young leaves variously pubescent, but not as above.
            - Stipules half-heart-shaped........ *S. nigra* 1.
            - Stipules kidney-shaped but early deciduous........ *S. amygdaloides* 2.
    - Scales brown, or black, at least at the tip.
      - Young leaves silvery-silky.
        - Pubescence of young leaves densely lanate........ *S. syrticola* 8.

Pubescence of young leaves thin .... *S. petiolaris* 10.
Young leaves variously pubescent or glabrous, but not silvery-silky.
Stipules minute, and early deciduous .... *S. pedicellaris* 15.
Stipules large, circular or half-heart-shaped .... *S. cordata* 7.

KEY TO MALE FLOWERS, YOUNG LEAVES, ETC.

Flowers appearing after the leaves; stamens 2 .... *S. interior* 5.
Flowers appearing with or before the leaves.
Flowers appearing before the leaves; stamens 2.
Twigs densely white-tomentose .... *S. candida* 9.
Twigs puberulent to glabrous, not densely white-tomentose.
Twigs black or very dark brown or purple .... *S. discolor* 12.
Twigs yellow to chestnut brown, mostly light yellow.
Branches with many bud-scars; tall shrub or tree with one to few stamens .... *S. Bebbiana* 11.
Branches with few bud scars; stems numerous and bushy, generally not over 3 m. tall.
Twigs stout .... *S. glaucophylla* 6.
Twigs slender.
Catkins showy, thickly obovoid .... *S. humilis* 13.
Catkins slender .... *S. tristis* 14.
Flowers appearing with the leaves.
Stamens 3-5 or more.
Stipules kidney-shaped or none.
Catkins stout, oblong to oval .... *S. lucida* 3.
Catkins slenderly long-cylindric .... *S. amygdaloides* 2.
Stipules half-heart-shaped.
Young leaves wholly glabrous .... *S. fragilis* 4.
Young leaves downy .... *S. nigra* 1.
Stamens 2.
Young leaves silvery-silky.
Pubescence of young leaves densely lanate .... *S. syrticola* 8.
Pubescence of young leaves thin .... *S. petiolaris* 10.
Young leaves glabrous or pubescent but not silky.
Branches with many bud-scars .... *S. Bebbiana* 11.
Branches with few bud-scars.
Stipules minute, early deciduous .... *S. pedicellaris* 15.
Stipules conspicuous, somewhat persistent, circular or half-heart-shaped .... *S. cordata* 7.

KEY TO MATURE LEAVES

Mature leaves glabrous beneath.
Base of leaf rounded or cordate.
Leaves dark green above, glaucous beneath, blackening in drying .... *S. glaucophylla* 6.
Leaves green on both sides, not blackening in drying.
Tree with very long-attenuate leaves .... *S. nigra* 1.
Low shrub with acute or acuminate but not long-attenuate leaves .... *S. cordata* 7.

- Base of leaf acute.
  - Leaf margins finely and evenly serrate or serrulate.
    - Leaves with long, slender, tapering points.
      - Leaves glaucous beneath .... *S. amygdaloides* 2.
      - Leaves not glaucous beneath.
        - Tree with very long-attenuate leaves .... *S. nigra* 1.
        - Low shrubs with acute but not very long-attenuate leaves.
          - Leaves narrowly lanceolate .... *S. petiolaris* 10.
          - Leaves broadly lanceolate .... *S. cordata* 7.
    - Leaves short-acuminate, leathery, shining .... *S. lucida* 3.
  - Leaf margins not finely and evenly serrate or serrulate.
    - Leaves strongly veiny beneath.
      - Leaf margins entire, revolute .... *S. pedicellaris* 15.
      - Leaf margins serrate-crenate .... *S. Bebbiana* 11.
    - Leaves not strongly veiny beneath.
      - Leaves acuminate at tip .... *S. fragilis* 4.
      - Leaves merely acute at tip.
        - Margins remotely denticulate .... *S. interior* 5.
        - Margins closely but irregularly crenate-serrate in the middle and subentire at tip and base. *S. discolor* 12.
- Mature leaves more or less pubescent beneath.
  - Leaf margins entire or nearly so, revolute.
    - Leaves with a thick tomentum beneath .... *S. candida* 9.
    - Leaves merely softly tomentose beneath.
      - Leaves somewhat glaucous and veiny beneath, on a longish petiole .... *S. humilis* 13.
      - Leaves not glaucous or veiny beneath, on very short petioles .... *S. tristis* 14.
  - Leaf margins finely and closely serrate, or crenate-serrate.
    - Leaves very veiny beneath, grayish-pubescent .... *S. Bebbiana* 11.
    - Leaves not veiny beneath.
      - Leaves clothed beneath with a thin reddish pubescence.
        - Leaves finely and evenly serrate .... *S. lucida* var. *intonsa* 3.
        - Leaves irregularly crenate-serrate .... *S. discolor* var. 12.
      - Leaves very shining-silky beneath, not reddish-pubescent.
        - Leaves ovate or broadly lanceolate, cuspidate-acuminate .... *S. syrticola* 8.
        - Leaves narrowly lanceolate, merely acute .... *S. interior* var. 5.

1. S. **nigra** Marsh. (*Black Willow.*) Tree with dark, flat, scaly bark, sometimes only a shrub; twigs reddish brown to pale orange, at first tomentose; stipules conspicuous, somewhat persistent, half-heart-shaped; young leaves more or less downy; mature leaves lanceolate, long, curved-tapering, acute at base, finely serrate, thin, bright green; flowers and leaves appearing together; catkins long, slender, with yellow deciduous scales; stamens 3-5; stigmas nearly sessile; capsule ovate-conic, glabrous, light reddish brown.—Along streams and around sloughs and pools, common. Early spring.

2. S. **amygdaloides** Anders. Tree 18-21 m. tall or a shrub; bark on old trees divided by irregular fissures into flat scaly ridges;

branches straight, ascending, slender, glabrous, with pale scattered bud-scars; twigs dark orange or red-brown; stipules early deciduous; young leaves downy beneath with long, pale or tawny hairs; mature leaves thin, firm, glabrous and glaucous beneath, dark green on both sides, acute at base, the tip long and slender, tapering; margins finely and evenly serrate or serrulate; flowers and leaves appearing together; catkins long, slender, curving, with yellow deciduous scales; stamens 5-9, the filaments free from each other; ovary with short style and fringed stigmas; fruit globose-conical, light reddish yellow.—Frequent in swamps and along creeks behind and between the high dunes, Miller to Michigan City and northeastward. Also west of Wolf Lake. Spring.

3. **S. lucida** Muhl. Shrub 1-3 m. tall, or small tree, with brown bark; twigs smooth, slender, dark brown; stipules kidney-shaped, somewhat persistent; young leaves covered with crisp ruddy hairs; mature leaves glabrous beneath, base acute, tip short-acuminate, ovate to lanceolate in outline, thick and shining; margins finely and evenly serrate or serrulate; flowers and leaves appearing together; catkins stout; scales yellow, deciduous; stamens 3-5 or more; style short; stigmas short and thick; capsule long and slender, smooth, brownish.—Common in moist sandy soil, especially along the shore of Lake Michigan, but also throughout the range locally. May.

Var. **intonsa** Fernald, with the leaves clothed beneath with a thin reddish pubescence, and the twigs of the first year similarly pubescent, is reported from Lake and LaPorte Counties (*Deam*), possibly from within our area.

4. **S. fragilis** L. (*Crack Willow.*) Tall slender tree with light gray bark; twigs reddish green, very brittle at the base; stipules comparatively large, half-heart-shaped, somewhat persistent; young leaves wholly glabrous, the base acute, the tip acuminate, lanceolate in outline, sharply serrulate, smooth on both sides, paler beneath; flowers appearing with the leaves; catkins slender; scales yellow, deciduous; stamens 3-5; capsule long-conic, glabrous.—Commonly cultivated European tree, locally established in the Calumet District and east to Dune Park. May.

S. alba L. (*White Willow*), differing from the preceding chiefly in its pale, silky leaves, and **S. babylonica** L. (*Weeping Willow*), both European trees, are much planted in our area and may sometimes establish themselves but are not known definitely to do so with us.

5. **S. interior** Rowlee. (*Sandbar Willow.*) Shrub 1.5-5.5 m. tall; stems numerous; twigs smooth, reddish brown; stipules none; young leaves thinly villous when young; mature leaves linear to elliptical, glabrous beneath, base acute, tip barely acute, margins remotely denticulate; flowers appearing after the leaves; catkins 1-3 together, long and slender, loosely flowered, the scales yellow and deciduous, thinly pubescent; stamens 2; stigmas nearly sessile, short; capsules narrowly conic. (*S. longifolia* Muhl., not Lam.)—A characteristic shrub both of dunes and low wet places, throughout. Horizontal stems from the base of the clump often rooting (Mrs. Chase). June.

Var. **Wheeleri** Rowlee. Leaves shining-silky beneath, narrowly lanceolate, merely acute, shorter and broader than in the type and more densely and somewhat permanently clothed with long hairs. —In water, edge of Long Lake.

6. S. **glaucophylla** Bebb. Low, spreading, bushy shrub not over 3 m. tall; twigs stout, yellowish to brown, downy at first, then glabrate; stipules half-heart-shaped or kidney-shaped; mature leaves glabrous beneath, the base rounded or cordate, the tip acute to short-acuminate, dark green above, glaucous beneath, elliptical-lanceolate or obovate, blackening in drying, the margins serrate or crenate-serrate; old leaves becoming veiny; flowers appearing before the leaves; catkins long and slender; scales brown or black, pubescent with long gray twisted hairs; stamens 2; style short, twice as long as the thick stigmas; capsule conic-subulate, glabrous.—Wooded dunes and along the shore of Lake Michigan from Roby to New Buffalo. May.

Var. **brevifolia** Bebb, with short, veiny, blunt leaves, sometimes occurs.

7. S. **cordata** Muhl. Bushy-stemmed shrub 2-6 m. tall, with yellowish to brown twigs which are puberulent when young; stipules showy, circular or half-heart-shaped; young leaves puberulent; mature leaves glabrous beneath, green on both sides, dark green above, narrowly to broadly lanceolate, the old ones strongly veiny, rounded or cordate at base, acuminate at tip; flowers appearing with the leaves; catkins slender, 3-7 cm. long, the scales brown or black; stamens 2; stigmas half as long as the style; capsule lanceolate from an ovate base, glabrous, greenish.—A common sand-binder on the high dunes and on the sands of Lake Michigan, close to the shore in the Calumet District. May.

8. S. **syrticola** Fernald. Low, spreading, bushy shrub, 1-3 m. tall; twigs short, stout, grayish, pubescent; stipules half-heart-shaped to subovate; young leaves silvery-silky with a dense lanate pubescence, persistently so on the under surface till late in the season, finally glabrous; mature leaves cuspidate-acuminate, ovate or broadly lanceolate, finely and closely serrate or serrulate; flowers appearing with the leaves, the catkins 2-4 cm. long, or the female finally 6-8 cm. long; scales pale brown, pilose; stamens 2; capsule conic-rostrate, smooth, reddish. (*S. adenophylla* of auths., not Hook.)—A common sand-binder on the high dunes and on the sands of Lake Michigan, close to the shore in the Calumet District. Also Furnessville, acc. to Lyon. May. Badly attacked by the "oyster scale" according to C. R. Ball.

9. S. **candida** Fluegge. (*Sage Willow.*) Low, much-branched shrub, 2-10 dm. tall; bud scars numerous; twigs densely white-tomentose; stipules lanceolate, acute; young leaves densely woolly, the mature thickly white-tomentose beneath, linear-oblong to narrowly lanceolate, acute at both ends, dull and thickly tomentose and sage green above, entire or nearly so; flowers appearing before the leaves, the female catkins 1 cm. long; scales brown or black, thinly white-pilose; stamens 2; stigmas short, notched; fruit lanceolate, white-

tomentose. (*S. candidula* Nieuwl.)—A far northern species, rather rare, around edges of tamarack bogs, Miller and Mineral Springs, boggy ground, Hammond.

10. **S. petiolaris** J. E. Smith. Shrub or small tree with few stems and gray bark; twigs slender, dark brown, smooth or pubescent; stipules so early deciduous that they are not usually seen; young leaves thinly silvery-silky; mature leaves glabrous beneath, linear-lanceolate or lanceolate, often somewhat blackening in drying, margins finely and evenly serrate or serrulate, with acute base and long, slender, tapering tip; flowers appearing with the leaves; catkins obovoid; scales brown; stamens 2; style obsolete; stigmas short; capsules lanceolate-conic, thinly silvery-pubescent.—Dune meadows, Mineral Springs. May. Has been reported from the shore of Lake Michigan, Lake Co. (H. & R.). Sloughs, Hammond to Clarke.

11. **S. Bebbiana** Sargent. Tree or shrub with one or a few stems; bark of old trees with broad flat scaly ridges; twigs stout, at first downy, yellowish to chestnut brown; branches with many bud scars; stipules leafy, half-heart-shaped; young leaves pale gray-green; mature leaves glabrous or grayish-pubescent and strongly veiny beneath; leaf margins remotely and irregularly serrate-crenate, base acute, tip acute or acuminate; flowers appearing with or before the leaves; scales yellow, rose-colored at the tip, persistent; stamens 2; stigmas sessile, broad, spreading; fruit oblong-cylindrical, narrowed to a long beak. (*S. rostrata* Richards., not Thuill.)—Swamps and tamarack bogs from Wolf Lake and Clarke to and beyond Michigan City. May. A far-northern species.

12. **S. discolor** Muhl. (*Pussy Willow.*) Shrub or rarely a small tree, with smooth reddish bark; twigs stout, black or dark purple; stipules large, roundish; mature leaves short-lanceolate to elliptic-oblanceolate, glabrous beneath and glaucous, dark shining green above, base acute, tip barely acute, margins closely but irregularly crenate-serrate in the middle and subentire; flowers appearing before the leaves; catkins stout, dense, the male catkins handsome; scales brown or black; catkins 2-4 cm. long, or finally 4-8 cm. long; stamens 2; stigmas equalling the styles; capsules conic, rostrate, densely gray-woolly.—In damp ground, throughout. A handsome species known by the marked contrast in color between the upper and lower leaf surfaces; flowers in April; leaves in May. Var. **eriocephala** (Michx.) Anders. has denser, very silky catkins and leaves sometimes rusty-pubescent even in age. Reported from dune meadows by Lyon.

13. **S. humilis** Marsh. var. **rigidiuscula** Anders. (*Prairie Willow.*) Shrub 1.5-3 m. tall; twigs yellowish to brown, slender; stipules lanceolate, toothed; mature leaves softly tomentose or glabrate and somewhat glaucous and very veiny beneath, on longish petioles, in outline narrowly oblanceolate, the margin revolute and undulate; flowers appearing before the leaves; scales black or brown; catkins crowded, 1.5-3 cm. long, showy, thickly obovoid; stamens 2; styles long; stigmas short, divided; capsule slender, long-beaked, gray-pubescent.—On dry sand dunes, Miller to Tamarack Station, also in sandy ground, Hammond. May, June. Frequently attacked by gall insects and producing galls resembling cones.

14. **S. tristis** Ait. Very similar to the preceding; low shrub, usually not over 1.5 m. tall, the stems numerous and bushy; twigs yellow or pale brown; mature leaves softly tomentose beneath, on very short petioles; margins entire or nearly so, revolute; leaves crowded, narrowly oblanceolate; flowers appearing before the leaves; scales brown or black; catkins 1-1.5 cm. long, slender, crowded; stamens 2. (*S. alpina* Walt.)— Dry sandy plains of the northern part of the Calumet District.

15. **S. pedicellaris** Pursh. (*Bog Willow.*) Shrub 0.5-2 m. tall, glabrous throughout; twigs brown or light olive-brown; stipules minute and rarely seen; mature leaves thickish and strongly veiny beneath, margins entire, revolute, outline oblanceolate or elliptical, base acute, tip blunt or barely acute; flowers appearing with the leaves; catkins cylindrical-oval, 1-3.5 cm. long; scales brownish-green; stamens 2; capsule lanceolate to narrowly conic.—Tamarack and other bogs from Roby, East Chicago, and Pine to Miller, Mineral Springs and eastward. Plants of our region are often referable to the not very distinct var. *hypoglauca* Fernald. A far-northern species. May.

WALNUT FAMILY (Juglandaceae)

Trees with alternate, odd-pinnate, large, aromatic leaves; stipules none; flowers appearing after the leaves unfold, the sexes in separate inflorescences on the same plant, the male catkins with an irregular calyx adhering to the bract, the female flowers solitary or in small spikes, with regular, 3-5-lobed calyx adherent to the ovary. Fruit a nut in a fleshy or hard shell; kernel edible or astringent.

Male flowers in simple catkins; husk of fruit not naturally splitting.. *Juglans* 1.

Male flowers in branched catkins; husk of fruit splitting by 4 sutures to or near the base........................ *Carya* 2.

1. JUGLANS L. Walnut

Male catkins on wood of previous year, with 3-6-lobed calyx and 8-40 stamens in 2 or more series; female flowers in few-flowered spikes at the end of the shoots of the season, with 4-lobed calyx, and 4 small petals adnate to the ovary; styles 2, short, fringed; nut irregularly furrowed; husk large, fleshy, aromatic.

Lower leaf surface heavily downy; petioles and branchlets clammy-downy.................................. *J. cinerea* 1.

Lower leaf surface only minutely downy; petioles and branchlets smoothish, or at least not clammy-downy........ *J. nigra* 2.

1. **J. cinerea** L. (*Butternut.*) Trees with thick furrowed bark; leaflets 7-17, rounded at base, oblong-lanceolate and pointed; fruit clammy, ellipsoid, pointed, the nut deeply furrowed and ragged.— Rich wooded dunes, Tremont, rare. Not fruiting much in our area. Flowers in late spring; fruit in autumn.

2. **J. nigra** L. (*Black Walnut.*) Tall tree with rounded crown and dark, deeply ridged bark; leaflets 11-21, tapering at tip, unequally heart-shaped at base, ovate-lanceolate; fruit rough-dotted, round; nut corrugated, 4-celled.—Valuable timber tree with beautiful purplish wood, rather rare and generally singly or in little groves back of the high dunes or on ridges near the Little Calumet, and near Schererville. Flowers in spring; fruit ripe in autumn.

2. CARYA Nutt. Hickory

Branches tough and flexible; leaves gland-dotted; leaflets serrate, unequal at base, lowest pair smallest; stamens 3-10; fruit nearly sessile; outer shell angled but smooth.

Bark shaggy, exfoliating in long strips; husk of the fruit at once splitting into 4 hard thick valves; seeds sweet... *C. ovata* 1.
Bark not shaggy, not exfoliating in long strips; husk of fruit thin, and tardily splitting into 4 valves only to the middle; seed bitter.
  Leaflets 5-7; lower leaf surfaces glandular-scaly; nut 3-5 cm. long, its shell thick and bony.................... *C. glabra* var. *villosa* 2.
  Leaflets 7-11, glabrous; nut barely 2.5 cm. long, its shell thin.. *C. cordiformis* 3.

1. **C. ovata** (Mill.) K. Koch. (*Shag-bark Hickory.*) Tall tree with bark shaggy in long thick deciduous plates; inner bud-scales showy; leaflets 5-7, the terminal largest and obovate, all taper-pointed; fruit globular; nut white. (*Hicoria* Britton.)—A fine timber and nut tree; sandy dune woods, and in groves on old beach ridges. Flowers, June; fruit, October.

2. **C. glabra** (Mill.) Spach var. **villosa** (Sarg.) Robinson. Tall straight smooth-barked tree with oblong-lanceolate or obovate-lanceolate, taper-pointed, serrate leaves, the lower surface paler and covered with peltate scales, the petioles, rachises, and peduncles sordid-villous; fruit pear-shaped. (*Hicoria glabra* var. Sarg.; *H. villosa* and *H. pallida* Ashe.)—Dune woods beyond Michigan City acc. to Pepoon.

3. **C. cordiformis** (Wang.) K. Koch. Medium-sized straight trees with smoothish bark, the catkins and young foliage early pubescent, but soon glabrous; leaflets lanceolate or oblong-lanceolate, tapered and sometimes curved; fruit 6-ridged, ellipsoid; nut white, with slender conical beak and persistent expanded stigma, its shell shallowly ribbed. (*C. amara* Nutt.; *Hicoria minima* and *H. cordiformis* Britton.)—Occasional in thin sandy woods of the Calumet District, especially on the western and southern borders, becoming common on the morainal hills just outside our range.

BIRCH FAMILY (Betulaceae)

Trees or shrubs with alternate, simple, straight-veined leaves and deciduous stipules; male flowers in catkins, female clustered, spiked or in scaly catkins; fruit a 1-seeded nut, with or without a leafy involucre; styles 2.

Male flowers solitary in the axil of each bract, without calyx; female flowers with a closed calyx; nut more or less enclosed in the involucral bracts and wingless.

- Bracts of the male flowers simple; female flowers in short catkins; nut small, achene-like.
  - Male catkins in winter enclosed in bud-scales; bark smooth and close, gray; female involucral bracts leafy at maturity, flat, more or less irregularly 3-cleft .... *Carpinus* 1.
  - Male catkins naked in winter, appearing in threes at the ends of the branches; bark shredding, grayish brown; female bracts growing together and enclosing a nut .... *Ostrya* 2.
- Bracts of the male flowers furnished with a pair of bractlets inside; female flowers few; involucre thick-leafy, enclosing large acorn-like nut .... *Corylus* 3.

Male flowers 3-6 in the axil of each bract, with a calyx; female flowers without a calyx; nut winged.

- Stamens 2; female flowers solitary, hop-like and papery at maturity; winter-buds covered with scales; bark on old trees separating into flakes or scales .... *Betula* 4.
- Stamens 4; female catkins racemose, woody at maturity; winter buds without scales; bark on old trees not separating in flakes .... *Alnus* 5.

1. CARPINUS L. Hornbeam

Trees with close gray bark; male flowers consisting of several stamens in the axil of each bract; female flowers several, spiked in a loose terminal catkin, with small deciduous bracts each subtending a pair of flowers; the single involucral bract open, enlarged in fruit and leafy, subtending the small several-seeded nut.

1. **C. caroliniana** Walt. (*Water Beech, Blue Beech.*) Trunks fluted or ridged; bark smooth, close, gray; leaves ovate to oblong, short- to long-pointed, doubly serrate, finally smooth except beneath along the veins; male catkins 2-3 cm. long, appearing in early spring on the sides of the twigs of the previous season; female catkins 1-2 cm. long on the shoots of the season; nut ovate, compressed, each face prominently 4-5-ribbed.—A handsome tree, not infrequent. Banks of the Grand Calumet at Miller and thence eastward to Michigan. April, May.

2. OSTRYA Scop. Ironwood

Leaves birch-like, appearing with the flowers; male catkins 1-3 together, with flowers consisting of several stamens in each bract axil; female flowers a pair in each deciduous bract, consisting of an ovary to which adheres the bearded border of the calyx, and a tubular bractlet surrounding the ovary which in fruit enlarges to a bladdery ellipsoid bag, much larger than the smooth nut, the whole fruit somewhat resembling that of the hop.

1. **O. virginiana** (Mill.) K. Koch. (*Hop Hornbeam.*) Small tree with shreddy brown bark; young twigs green, hairy, becoming smooth and brown; leaves ovate to lanceolate, acute, sharply serrate, smooth

above at maturity and pubescent in tufts on the veins beneath; nuts light brown, 8 mm. long, ovoid, flattened, obscurely ribbed.—Tough-wooded; stems often forking like a shrub. Rare in the richer soils, along streams from Lake Co. to Michigan.

3. CORYLUS L. Hazelnut. Filbert

Male catkins solitary or several together from scaly buds in the axils of the preceding year, the flowers consisting of 8 stamens and a pair of scaly bractlets cohering with the inner face of the catkin scale; female flowers several from a scaly bud; ovary tipped with the short calyx limb; nut ovoid or subglobose, surrounded by a leafy, leathery involucre made up of the two bractlets and having frequently a cut-toothed border.

1. **C. americana** Walt. Shrub with branchlets more or less densely hairy; leaves ovate to orbicular and broadly ovate, doubly serrate, pubescent above, thickly so beneath and glandular; fruits 2-4 in a cluster.—In dry or moist soil among the thickets of the sandy plains back of the big dunes, as at Tremont. A delicious eating nut. Flowers in March or early April. Fruits in October.

4. BETULA L. Birch

Male catkins terminal and lateral, sessile, and expanding in early spring with or before the leaves; flowers 3 to each scale of the catkin, the calyx a single scale, bearing 4 short filaments; female catkins ovoid to cylindrical, 2 or 3 to a bract, each a naked ovary, becoming a winged and scale-like nutlet (*samara*) crowned with the 2 spreading stigmas.

Leaves 6-10 cm. long, mostly thin and papery, with 6-15 pairs of veins; fruiting catkins 3 cm. long or more; mostly trees.	
Fruiting catkins sessile or nearly so, erect, oblong-ovoid, 11-18 mm. thick; wing narrower than the nutlet; leaves with 9-15 pairs of veins, oblong-ovate or ovate, sharply doubly serrate; bracts ciliate along the margins.	*B. lutea* 1.
Fruiting catkins pedicelled, spreading or pendent, or erect, 5-10 mm. thick, wider than the nutlet; leaves with 6-9 pairs of veins.	*B. papyrifera* 2.
Leaves 2-6 cm. long, thick and firm in texture, with 3-7 pairs of veins; fruiting catkins mostly less than 3 cm. long.	
Leaves ovate to broadly oval, with 5-7 pairs of veins; fruiting catkins oblong-ovoid, 1.5-2.8 cm. long, 10-13 mm. thick, short-stalked or sessile; bracts smooth, 5.5-7 mm. long; twigs aromatic; samara obovate, about 3.4 mm. broad.	*B. Sandbergii* 3.
Leaves obovate or oval, with 3-5 pairs of veins; fruiting catkin cylindric or ovoid-cylindric, 5-6 mm. thick, distinctly pedicelled; bracts 3-3.5 mm. long; twigs not aromatic; wing of samara narrower than the nutlet.	*B. pumila* 4.

1. **B. lutea** Michx. var. **macrolepis** Fernald. (*Yellow Birch.*) Tall tree; bark of old trunks fissured into wide plates, curling, dull dark brown; bark of small trees and young branches light gray; branchlets

hairy, becoming smooth and reddish brown, faintly aromatic; leaves hairy, or finally dark green and smooth above, paler hairy beneath, resinous-dotted.—In low wet woods near tamarack bogs, with elm, ash and Nyssa. May.

B. populifolia Marsh (*Old Field Birch*), a little tree with chalky-white bark and triangular-ovate leaves, has been repeatedly reported from our region (H. & R., etc.) though generally as second-hand information. It may yet be found in this region, but has probably been confused with *Populus tremuloides* saplings.

2. **B. papyrifera** Marsh. (*Paper*, *Canoe* or *White Birch.*) Bark thin, creamy white, chalky, readily separating into thin layers; young twigs green, sticky, becoming reddish brown; leaves ovate, gradually tapering to apex, rounded or subcordate at the base, dark green, smooth above, paler beneath; nut oval, half as wide as its wings. (*B. papyracea* Ait.; *B. alba* var. *papyrifera* Spach.)—A beautiful and graceful tree with light, close-grained, strong, light-brown wood, used chiefly for spools. Makes good fire-wood. Rather rare, at Pine and Clarke, and on a blueberry marsh at Mineral Springs. May.

3. × **B. Sandbergii** Britton. Shrub; bark dark brown, not separating; branchlets rusty, finally puberulent and resin-dotted; old twigs with slitting gray bark, revealing inner reddish-brown bark; leaves rhombic-ovate to obovate, serrate, pubescent on the veins below, finally glabrous and resin-dotted, dull green, reticulate; fruiting catkins erect, cylindric, 2-2.5 cm. long, 6-7 mm. in diameter.—A hybrid between *Betula papyrifera* and *B. pumila* var. *glandulifera*, growing in the tamarack bog at Mineral Springs. May.

4. **B. pumila** L. var. **glandulifera** Regel. (*Dwarf Birch.*) A shrub usually 1-3 m. tall; bark smooth and reddish brown; young twigs, leaves, and bracts glandular-pubescent; leaves obovate, oval, or nearly orbicular, wedge-shaped at base, rounded at apex, coarsely serrate, ultimately smooth; nut ovate to obovate, the wings narrower than the nut.—In tamarack bogs. May.

5. ALNUS L. Alder

Shrubs or small trees with solitary or racemose-clustered catkins, the male catkins with 4 or 5 bractlets and 3 flowers on each short-stalked shield-shaped scale, the flower with a 3-5-parted calyx and stamens of the same number; female catkins ovoid or ellipsoid, the fleshy scales each subtending 2 flowers and 4 little scales adhering to the bracts of the catkins which in fruit become woody, and are wedge-obovate.

In our species the flowers develop in early spring or winter, before the leaves.

Leaves broadly elliptical to ovate, rounded at base, upper surface with impressed nerves, the lower downy, at least on the nerves..............................	*A. incana* 1.
Leaves obovate, acute at base, upper surface with veins not impressed, the lower mostly smooth..................	*A. rugosa* 2.

1. **A. incana** (L.) Moench. (*Speckled Alder.*) Shrub or small tree up to 6 m. tall; leaves sharply and doubly serrate, the upper surface dark green, 4-10 cm. long, 3-7 cm. broad; fruit round.—Common in moist thickets, along streams, on the edges of tamarack bogs; throughout, especially from Miller eastward. March, April.

2. **A. rugosa** (Du Roi) Spreng. (*Smooth Alder.*) Shrub or small tree up to 6 m. tall; leaves mostly regularly serrate, 4-11 cm. long; fruit ovate.—Has been reported (H. & R.) from the northwest corner of the Calumet District, and may perhaps occur elsewhere on the prairies; it seems not to be found in the true dune area, however, and, lacking more detailed information, must be regarded as rare. March, April.

BEECH FAMILY (Fagaceae)

Trees or shrubs with alternate, simple, straight-veined leaves, and deciduous stipules; the sexes in different inflorescences on the same tree, the male flowers in catkins or head-shaped clusters, the female solitary or slightly clustered. The fruit is a 1-seeded nut enclosed, at least partly, in a cupule formed by merged bracts which become hard (as the shell of a beech nut, or the acorn cup).

Trees with smooth light gray or whitish bark, the leaves unlobed; male flowers in heads on drooping peduncles, the nuts triangular, wholly enclosed in a woody husk with curved prickles .... *Fagus* 1.

Trees with ultimately furrowed or scaly bark, the leaves generally lobed or deeply sinuate; the male flowers in slender catkins; nuts round, partly enclosed in a cupule (acorns) .... *Quercus* 2.

1. FAGUS L. Beech

Male flowers with deciduous scale-like bracts and a 5-7-cleft, bell-shaped calyx and 8-16 stamens; female flowers usually in pairs at the top of a short peduncle, many-bracted, inner bracts cohering to form a 4-parted involucre; calyx lobes 6; nuts usually 2 in each involucre, which splits to below the middle at maturity.

1. **F. grandifolia** Ehrh. A tall and often thick tree, with smooth gray bark and whitish branchlets, the young twigs reddish-brown, the foliage arranged in a light horizontal spray; leaves ovate to oblong-ovate, long-taper-pointed, regularly and minutely serrate, silky when young, smooth above when old; nuts 1-1.5 cm. long, triangular, reddish-brown, pubescent.—Flowers appearing with the leaves in May. Found only in rich, cool, loamy woods, along the creeks back of the high dunes from Mineral Springs eastward, becoming more frequent around Michigan City and thence to the Michigan state line.

2. QUERCUS L. Oak

Trees with greenish, yellowish or reddish flowers, the male catkins single or often several together from a scaly bud, drooping and slender, with caducous bracts, and a 2-8-parted calyx, and 3-12 stamens;

female flowers scattered or somewhat clustered, containing a 3-celled ovary and 3-lobed stigma and enclosed in a bud-like scaly involucre which develops later as the cup of the fruit which is an acorn.

The oaks are the dominant trees of most parts of our area. In the Calumet District they are not often found on the prairies nor close to the present shore of Lake Michigan, but on the old beach ridges of glacial Lake Chicago they are frequent and often enable one from some distance to pick out the position of ancient beaches. The oaks of the Calumet District are generally stunted. Underneath them there is a characteristic undercover, mostly of grasses, of which *Stipa spartea*, and *Koeleria cristata* are representative. The oaks of the true dunes are abundant. While poplars, lindens, willows, etc. mark the younger or forming dunes, oaks are the dominant trees on the old, heavily forested dunes and there they attain their greatest height and girth. Oaks of the dunes have also a characteristic undercover, chiefly of composites and legumes, such as *Kuhnia*, *Liatris*, *Aster*, *Solidago*, *Helianthus*, *Lupinus*, *Lespedeza*, *Desmodium*, and *Tephrosia*. The oak woods of the high dunes, more than any other trees, give to the autumn woods of this area their glorious appearance.

The nuts of the red and black oaks are generally inedible, but those of the white and chestnut oaks are edible when fully ripe and quite palatable when boiled.

Trees with dark furrowed bark; leaves with unlobed entire margins or lobed margins with veins projecting as bristles; stamens 4; cup scales membranaceous; styles long, spreading; inner surface of the acorn shell tomentose; fruit maturing the second year.	
Leaf margins generally entire, only the tip bristle-pointed; acorns globular, not over 13 mm. long	*Q. imbricaria* 1.
Leaf margins lobed, the veins extending beyond them as bristle tips.	
Scales of the cup loosely overlapping	*Q. velutina* 2.
Scales of the cup closely appressed.	
Cup only 3-5 mm. high, 1.1-5 cm. broad	*Q. palustris* 3.
Cups larger	*Q. ellipsoidalis* 4.
Trees with light gray scaly bark; leaves with lobed or crenate margins but never with the nerves extending as bristles; stamens 6-8; cup scales more or less woody and knobby at the base; inner surface of the acorn shell glabrous; nut maturing the first year.	
Leaves distinctly lobed.	
Mature leaves glabrous beneath	*Q. alba* 5.
Mature leaves pubescent beneath	*Q. macrocarpa* 6.
Leaves not lobed, merely sinuate or crenate on the margins.	
Leaves acute at base, white-hoary beneath; fruit pedunculate	*Q. bicolor* 7.
Leaves truncate or rounded at base, not white-hoary beneath; fruit sessile	*Q. Muhlenbergii* 8.

1. **Q. imbricaria** Michx. (*Shingle Oak.*) Tree attaining as much as 30 m. in height, but in our region generally low-growing; bark on the trunk deeply fissured, the ridges much broken, dark brown to nearly black; branchlets at first hairy, becoming smooth, gray, red-

dish or dark brown; leaves oblong, narrow, acute at both ends, thickish, smooth and shining above, downy beneath; cup deeply saucer-shaped, about half as high as the globose nut.—Old beach ridges, Pine, rare, but more abundant south of the Little Calumet. April, May.

2. **Q. velutina** Lam. (*Black Oak.*) Tall tree with dark brown or black furrowed outer bark and orange inner bark; leaves pinnatifid or lobed, more than half way to the midvein, with about 8 principal and narrow sinuses, firm, brown-pubescent when young, at length dark green and dull and smooth above, and paler beneath, with pubescent veins; cup hemispheric, short-stalked, pubescent, about half as high as the ovoid acorn. (*Q. tinctoria* Bartram.)—Perhaps the commonest oak of our region, both on dunes and in the Calumet District. May, June. The bark and wood are valued in tanning and the inner bark yields an important dye known as quercitron.

3. **Q. palustris** Muench. (*Swamp Pin Oak.*) Leaves deeply pinnatifid, the sinuses broad and rounded, the lobes divergent; cup flat-saucer-shaped, its scales small, the globose depressed acorn much longer than its cup.—Occasional in swamps among the high dunes and on the low wet plains east of Dyer.

4. **Q. ellipsoidalis** E. J. Hill. (*Hill's Oak.*) A low-growing, straggling tree with gray, close bark which is smooth or in age shallowly fissured; inner bark yellow; leaves much as in the preceding but with axillary tufts of hairs beneath and turning yellow or pale brown in autumn instead of scarlet; cup narrow and deeply saucer-shaped, covering about one-half or more of the small, puberulent, dark brown, often striped acorn.—Rather rare; found on old beach ridges near Liverpool and south of the Little Calumet. It was first discovered by E. J. Hill, ardent botanist of the dune region for thirty years.

5. **Q. alba** L. (*White Oak.*) Large forest tree with thin plates of gray bark; leaves obovate in outline, with narrow lobes, the sinuses broad, the upper surface bright green, the lower paler and glabrous or pubescent when young; cup shallow and broad; scales finally glabrous; acorn oblong, 3-4 times as high as the cup.—A common handsome tree of the high dunes and richer woods; leaves reddish brown in autumn. May, June.

Q. stellata Wang. (*Post Oak*) has been reported from Whiting (H. & R.) and elsewhere, but not verified.

6. **Q. macrocarpa** Michx. (*Overcup* or *Bur Oak.*) Large tree with gray and somewhat flaky bark; leaves obovate in outline, lyrately pinnatifid, the segments mostly narrow (except the terminal one) and the sinuses broad, the underside downy or pale; cup thick, woody, with hard thick scales and a mossy fringe of awns at the rim; the roundish acorn is nearly covered by the cup.—Frequent on high dunes and old beach ridges, often a tree of magnificent stature. May, June.

7. **Q. bicolor** Willd. (*Swamp White Oak.*) A large tree with flaky bark; leaves in outline obovate, wedge-shaped at base, the margin coarsely sinuate-crenate or slightly pinnatifid, soft-downy or white-hoary beneath; cup hemispheric, with woody scales which are some-

what awn-tipped but not so much so as in the preceding species; acorn ovoid, about twice as long as the cup.—Frequent on dunes and old beach ridges, throughout. May, June.

8. Q. **Muhlenbergii** Engelm. (*Chestnut Oak.*) A tall tree with flaky bark and slender, petioled leaves with margins like those of a chestnut leaf, that is with numerous regular sharp crenations which are acute and forward-curved, the outline oblong, acute at the tip; cup thin, shallow, about one-half as long as the ovoid acorn, with small appressed scales. (*Q. acuminata* Sarg.)—In our area this tree has been noted from the northwest shores of Wolf Lake, but it may occur southward on limestone prairies. In this grove a hybrid with *Q. macrocarpa* has been found and was so identified by Sargent, acc. to Pepoon. May, June.

ELM FAMILY (Ulmaceae)

Trees or shrubs with alternate, simple, serrate, petioled, stipulate leaves, the stipules early deciduous; flowers small, perfect or polygamously unisexual; petals none; sepals 3-9; stamens as many and opposite them; ovary 1-celled; styles 2.

Leaves with single central primary nerve; flowers on last year's branches, polygamous; anthers extrorse; fruit a winged samara with a central primary nerve........ *Ulmus* 1.

Leaves with 3 primary veins; flowers on branches of the new year, polygamous-unisexual; anthers introrse; fruit a drupe.. *Celtis* 2.

1. ULMUS L. Elm

Flowers in fascicles or racemose, greenish, unfolding before the leaves, borne in axils on the old twigs; calyx bell-shaped, 4-9-lobed; samara round, the wing continuous all around except at the apex.

Leaves ovate-oblong, taper-pointed; flowers sessile; fruit roundish, not ciliate............................ *U. fulva* 1.

Leaves obovate-oblong, abruptly pointed; flowers on long drooping pedicels; fruit oval or ovate, ciliate with fine hairs on the margins............................ *U. americana* 2.

1. U. **fulva** Michx. (*Slippery Elm.*) Medium-sized or little trees, 15-20 m. tall, with mucilaginous inner bark and leaves, tough reddish wood and light outer bark; buds at first rusty-woolly; leaves doubly serrate, ovate-oblong, taper-pointed, sweet-scented in withering; calyx lobes and stamens 5-9.—Rich wooded dunes, Tremont (acc. to Lyon), rare. Early spring.

2. U. **americana** L. Tall tree with flaky gray bark and erect-arching branches, forming an umbrella-shaped crown; twigs and buds smooth or sparingly pubescent; leaves oval, unequal-sided at base, sharply doubly serrate, rough above, dull green, paler below.—Rich meadows and stream bottoms along the morainal borders of our area or occasional in red maple swamps back of the high dunes as at

Mineral Springs, also plentiful in thickets between Wolf Lake and Lake George. April, May. A valuable timber tree much planted for ornament though generally not the best to stand the fumes of the cities in our area.

2. CELTIS L. Hackberry

Flowers axillary, greenish, the lower generally only male and clustered or racemed, the others male and female, the latter solitary or in pairs; calyx 5-6-parted, persistent; stamens 5-6; stigmas 2, long, pointed, curved.

1. **C. pumila** (Muhl.) Pursh. Dwarf shrub with smooth gray bark, or warty-fissured in old specimens; twigs thorn-like; leaves ovate, taper-pointed, margins entire or nearly so or coarsely toothed above the middle, at first hairy, finally dark green and smooth above and paler beneath, thickish; flowers appearing with the leaves; fruit wine-red or dark maroon, on upwardly curved stalks. (*C. maritima* Raf.; *C. occidentalis* L. var. Muhl.)—Frequent on tops of bare high dunes from Mineral Springs westward; in the Calumet District it occurs only north of the Grand Calumet.

BREADFRUIT FAMILY (Artocarpaceae)

Woody plants with milky juice; leaves alternate, simple; flowers inconspicuous, the sexes generally separate, the inflorescence catkin-like, or spiked; in our species the calyx 4-parted; stamens 4, the anthers inflexed in bud; ovule pendulous; fruit an achene, but imbedded with many other achenes in a fleshy compound fruit of united drupelets.

1. MORUS L. Mulberry

Trees with lobed leaves, 3-5-nerved from the base; flowers in hanging catkins, the male soon drooping; fruit blackberry-like; ovary small, sessile; style 2-parted.

1. **M. alba** L. (*White Mulberry.*) Small round-headed tree with light bark, and light green, thin, scabrous, 3-lobed, small leaves.—Intr. from Eu., cult. in our area and escaped, Dyer to Miller.

HEMP FAMILY (Cannabinaceae)

Leaves lobed or divided, at least the lower opposite; filaments erect in bud; ovules pendulous; embryo coiled; sepal 1, enclosing the ovary; in these respects differing from the following family which it resembles in comprising herbs with watery juice, and having flowers with sexes on different plants, the male in racemes or panicles, the female in clusters or catkins, the leaves unequal-sided at base; stipules persistent; fruit an achene.

Erect plants with deeply 5-7-divided leaves; female flowers in spiked clusters.................................. *Cannabis* 1.

Prostrate or climbing plants with somewhat 3-5-lobed leaves; female flowers in a short spike, becoming a membranous catkin in fruit .... *Humulus* 2.

1. CANNABIS L. Hemp

Tall rough annual with digitate leaves of 5-7 lanceolate, coarsely toothed leaflets, the upper alternate; flowers green, the male with 5 sepals and 5 drooping stamens; fruit a hard achene.

1. C. sativa L. (*Hemp.*) Inner bark containing tough fibres from which the hemp of commerce is derived. (*C. indica* L.)—Intr. from Asia and nat., a rare waif around the Calumet District.

2. HUMULUS L. Hop-vine

Twining rough perennials with backwardly-prickly stems; leaves palmately 3-11-lobed, heart-shaped, mostly opposite; stamens and sepals 5; female catkins short, axillary and solitary, with leaf-like bract, each bract 2-flowered and overlapping.

Lobes of leaf attenuate to apex, finely toothed............ *H. americanus* 1.

Lobes of leaf short at apex and often nearly obtuse, coarsely toothed.. *H. Lupulus* 2.

1. **H. americanus** Nutt. (*American Hop.*) Leaves 3-11-lobed, finely toothed, long-attenuate to the apex, terminal lobe narrow, the breadth only half the length; male panicle rather open, the pedicels curved at right angles beneath the flower; perianth conspicuously glandular; fruiting scales acuminate.—Rare in sandy soil around Tremont. Summer. This species has often been confused with the following.

2. **H. Lupulus** L. (*European Hop.*) Leaves 3-7-lobed, more or less deeply; middle lobe about as broad as long; under-surface sparsely rough, margins very rough; petioles short; male panicle narrow; perianth scarcely glandular; scales obtuse.—Intr. from Eu., cult., and escaped as a waif in the Calumet District. Summer.

NETTLE FAMILY (Urticaceae)

As in the preceding family, but the alternate or opposite leaves unlobed or undivided, the anthers incurved in bud, the ovule erect in the ovary, the embryo of the seed straight; calyx 2-5-lobed or -cleft. Herbs with watery juice, some beset with stinging hairs; leaves generally unequal at base; flowers greenish and inconspicuous.

Plants beset with more or less stinging hairs.
  Leaves alternate.................................. *Laportea* 2.
  Leaves opposite.................................. *Urtica* 1.
Plants not bristly.
  Stems translucent.................................. *Pilea* 3.
  Stems not translucent.............................. *Boehmeria* 4.

1. URTICA L. Nettle

Stipules distinct; flowers greenish, the sexes generally in separate flowers on the same plant, the clusters in racemes, spikes, or loose heads; sepals and stamens 4 in the male flowers, the female flowers with 4 stamens in 2 pairs, the outer smaller, the two inner enclosing the achene in fruit.

1. **U. gracilis** Ait. Stem 0.6-3 m. tall, slender, grayish-pubescent; leaves narrowly lance-oblong, pointed, serrate, 3-5-nerved from the rounded base, nearly glabrous; spikes loosely panicled, slender.—Moist thickets, Clarke and perhaps elsewhere. The stinging bristles sparse. Summer and autumn.

2. LAPORTEA Gaud. Wood Nettle

Sexes on the same or different plants, the flowers greenish, clustered in loose cymes, the upper widely spreading and female, the lower male; male flowers with 5 stamens and sepals, female with 4 sepals; achene ovate, flat, reflexed on the margined pedicel.

1. **L. canadensis** (L.) Gaud. Stem 6-9 dm. tall; leaves strongly feather-veined, long-petioled, pointed; female cymes spreading; stipule only one, 2-cleft; stinging bristles abundant. (*Urticastrum* Kuntze.)—In rich low woods along Dune Creek and perhaps elsewhere. July-September.

3. PILEA Lindl. Clearweed

Smooth low herbs with united stipules, the male flowers often mixed with the female, with 3-4 sepals and stamens; sepals 3 in female flowers, separate, accompanied by scales (rudimentary stamens).

1. **P. pumila** (L.) Gray. Stems smooth, shining, 1-5 dm. tall; leaves opposite, ovate, coarsely toothed, 3-ribbed, veiny; flower clusters much shorter than the petioles. (*Adicea* Raf.)—A plant easily known by its angular stems which are nearly transparent and very watery and pale green. In rich moist shady ground, Calumet Region and perhaps elsewhere. Rare. Midsummer.

4. BOEHMERIA Jacq. False Nettle

Resembling *Urtica* but stingless, the female flowers with united sepals forming a 2-4-lobed, urn-shaped calyx, the single style elongated-awl-shaped and papillose-stigmatic on open side; achene elliptical, closely surrounded by the dry calyx.

1. **B. cylindrica** (L.) Sw. Smooth or somewhat pubescent, 3-9 dm. tall; leaves mostly opposite, sometimes alternate, 3-nerved, ovate or ovate-lanceolate, serrate, pointed; sexes on the same or different plants, the small clusters densely aggregated in axillary long spikes, the female inflorescences continuous, the male often interrupted, frequently leafy at the top above the inflorescences.—In moist or shady ground of the Calumet Region, also Dune Creek woods. Midsummer.

Var. **scabra** Porter. Leaves scabrous, smaller, narrower, less sharply pointed.—In woods and in open bogs, Mineral Springs. Summer.

AMARANTH FAMILY (Amaranthaceae)

Weedy herbs in our species, with alternate or sometimes opposite leaves without stipules, and overlapping small greenish flowers, each subtended by 1-3 papery bracts; the persistent calyx of 3-5 sepals or none, and the stamens 3-5; stigmas 2-5; ovary 1; petals none; fruit a utricle.

Leaves alternate.
  Sexes, in part at least, in different flowers on the same plant; all flowers with a calyx........................ *Amaranthus* 1.
  Sexes on different plants; female flowers without a calyx.. *Acnida* 2.
Leaves opposite.. *Froelichia* 3.

1. AMARANTHUS L. Amaranth. Pigweed

Coarse annual weeds with petioled, entire, alternate leaves with prickly-pointed tips and axillary or terminal, spiked clusters of small greenish or purplish flowers, each flower 3-bracted; stamens 2-5; stigmas 2 or 3; fruit 2-3-beaked, longer than the calyx, 1-seeded.

Flowers in terminal and axillary, generally panicled spikes; stems erect; leaves long-petioled; stamens and sepals 5.
  Flowers bright purplish red; sepals shorter than the fruit.. *A. paniculatus* 3.
  Flowers green or the spikes lightly tinged with red; sepals equalling or longer than the fruit.
    Sepals acute; flower spikes slender, green or yellowish green; plants practically glabrous............... *A. hybridus* 2.
    Sepals obtuse and often notched at apex; spikes stout, whitish; inflorescence hairy.................... *A. retroflexus* 1.
Flowers crowded in close, small, axillary clusters; stems low; stamens 2 or 3; sepals 3.
  Stems erect or ascending; bracts subulate, sharp-pointed; fruit rugose.................................. *A. graecizans* 4.
  Stems prostrate; bracts ovate-oblong, acuminate but not spiny-pointed; fruit not rugose.................. *A. blitoides* 5.

1. A. **retroflexus** L. Roughish and pubescent, 0.3-2 m. tall; leaves long-petioled, wavy-margined, ovate or rhombic-ovate, dull green.—Introduced from the Southwest, along railroad tracks and around cities. Summer.

2. A. **hybridus** L. Similar to the preceding, smoother, dark green.—Very common, waste places and cultivated grounds, and around cities. Summer. Nat. from trop.

3. A. **paniculatus** L. Leaves oblong-ovate to ovate-lanceolate; spikes graceful, showy, panicled; bracts short-pointed but not long-awned. (*A. cruentus* L.; *A. hybridus* var. *paniculatus* Uline & Bray.) —Nat. from Trop. Amer., along railroads of the Calumet District. Summer.

4. **A. graecizans** L. (*Tumbleweed.*) Pale green, with whitish stem, smooth, diffusely branched; leaves small, obtuse or notched at apex, obovate; seed 0.8 mm. broad.—After flowering it dries up and rolls away as a tumbleweed. Usually as far east as Indiana it is not native but naturalized from the Great Plains, but it appears to be native on the beaches and sandy prairies of our area. Summer.

5. **A. blitoides** Wats. Similar to the preceding, the seed 1.5 mm. broad.—Along railroad tracks, nat. from Great Plains. Summer.

2. ACNIDA L. Water Hemp

In habit like *Amaranthus;* bracts 1-3, unequal; sepals bristle-tipped, 5, exceeding the bracts; stamens and stigmas 5, the latter long and plumose.

1. **A. tamariscina** (Nutt.) Wood. Tall and erect with flexuous branches and lanceolate to rhombic-ovate, acute leaves; female flowers clustered in dense spikes; bracts rigid, exceeding the small utricle. (*Amaranthus* Nutt.)—A species almost as closely allied to *Amaranthus* as to *Acnida.* Rare, on railroad ballast; adv. from Great Plains. Summer.

3. FROELICHIA Moench.

Annual silky plants with 3-bracted, perfect flowers in panicled spikes; calyx tubular, 5-cleft at the summit; stamens 5, united by their filaments into a tube; ovary ovoid; fruit a utricle enclosed in the stamen tube.

1. **F. floridana** (Nutt.) Moq. Stout, 3-5 dm. tall; leaves slender; spikes opposite; fruiting calyx vertically wing-crested.—Nat. from south or west, along railroad tracks. Summer.

GOOSEFOOT FAMILY (Chenopodiaceae)

Annual or perennial weedy herbs with angled, striate or roundish stems and alternate or opposite, mostly petioled leaves without stipules; flowers small, regular, greenish or purplish; petals none; calyx 2-5-lobed or parted, persistent or wanting in the female flowers; stamens as many as the calyx lobes or fewer, and opposite them; ovary free from the calyx; styles 1-3; fruit a utricle with thin or leathery pericarp.

Mature calyx with a broad horizontal wing.
  Plants spiny.. *Salsola* 5.
  Plants not spiny...................................... *Cycloloma* 1.
Mature calyx without a broad horizontal wing.
  Fruit enclosed by two leafy bracts.................... *Atriplex* 3.
  Fruit not bracted.
    Fruit enclosed by the calyx......................... *Chenopodium* 2.
    Fruit surpassing the calyx.......................... *Coriospermum* 4.

1. CYCLOLOMA Moq. Winged Pigweed

Coarse much-branched annuals with alternate sinuate-toothed petioled leaves and very small scattered sessile flowers; panicles open; flowers perfect or some only female, bractless; calyx with strong keels on the concave lobes, in fruit broadly winged; stamens 5; styles 3 or rarely 2.

1. **C. atriplicifolium** (Spreng.) Coult. Pale green or suffused with purple, often cobwebby-pubescent, 1-5 dm. tall; leaves lanceolate, coarsely and sharply irregularly serrate; flowers purple or greenish, small but not inconspicuous.—This curious plant is frequent on the beaches of Lake Michigan; it often forms tumbleweeds. This area would appear to be nearly its most easterly indigenous station; farther east it is certainly introduced from the Great Plains. Midsummer.

2. CHENOPODIUM L. Pigweed. Goosefoot

White-mealy or glandular weeds, in our species; flowers sessile in small clusters, these in spiked panicles; flowers bractless; calyx 5- (4-) lobed, more or less enclosing the fruit; stamens 5 with filiform filaments; styles 2. The plants are often eaten for greens, like spinach.

Pubescence glandular; plants aromatic.
Flowers in glomerules on spikes........................ *C. ambrosioides* 1.
Flowers solitary, sessile in open forking cymes which are loosely spiked................................ *C. Botrys* 2.
Pubescence more or less mealy; plants not aromatic but sometimes with a rank or heavy odor.
Leaves entire.
Leaves attenuate to a slender petiole................ *C. Standleyanum* 9.
Leaves short-petioled.............................. *C. leptophyllum* 7.
Leaves, at least the lower, toothed or with sinuate-angled or sinuate-pinnatifid margins.
Leaves triangular.
Base of the leaves cordate or rarely abrupt.......... *C. hybridum* 5.
Base of leaf halberd-shaped........................ *C. capitatum* 3.
Leaves not triangular.
Leaves sinuately pinnatifid-toothed................ *C. glaucum* 4.
Leaves with sinuate-dentate or angulate margins, but not pinnatifid-toothed.
Leaves, at least the lower, rhombic-ovate.
Flowers glomerate.......................... *C. album* 6.
Inflorescence loose.......................... *C. murale* 8.
Leaves, even the lower, oblong- to linear-lanceolate, attenuate at base........................ *C. Standleyanum* 9.

1. **C. ambrosioides** L. (*Mexican Tea.*) Smoothish annual with slightly petioled oblong leaves with almost entire or repand-toothed margins; spikes leafy, densely flowered.—In waste ground, yards, roadsides, etc.; a common weed introduced from trop. Amer. Midsummer.

Var. **anthelminticum** (L.) Gray. (*Wormseed.*) Leaves strongly toothed or even laciniate-pinnatifid; spikes nearly leafless, elongated.—With the type, nat. from trop. Am.

2. C. **Botrys** L. (*Feather Geranium, Jerusalem Oak.*) Viscid and glandular; leaves petioled, sinuate-pinnatifid with angled, obtuse lobes, oblong in outline; racemes cyme-like, leafless, spreading.—Along the shores of Lake Michigan; intr. from Eu.

3. C. **capitatum** (L.) Asch. (*Strawberry Blite.*) Stem branched, ascending; flowers in large, interruptedly spiked clusters; fruit scarlet, pulpy, resembling a strawberry.—Reported from Whiting by Cowles, acc. to Pepoon. Probably nat. from Great Plains, though possibly native. Summer.

4. C. **glaucum** L. (*Goosefoot.*) Low and spreading, glaucous, mealy throughout; leaves oblong in outline, pale green above and whitened beneath; flower clusters small, in axillary spikes.—In waste ground, Calumet District. Intr. from Eu.

5. C. **hybridum** L. (*Pigweed.*) Stem widely and much branched, erect, the whole plant bright except the purplish, square, coarse stems; leaves taper-pointed, cordate at base, triangular in general outline; racemes leafless, loosely panicled.—In the Calumet District and among the dunes, occasional; often appearing introduced but probably native here.

6. C. **album** L. (*Lamb's Quarters.*) Plants erect; leaves lanceolate to rhombic-ovate; flower clusters dense, in panicled spikes.—In the Calumet District and along roads eastward; intr. from Eu. It makes an excellent spinach and is often gathered by foreigners in our area.

7. C. **leptophyllum** Nutt. (*Goosefoot.*) Plant 2-7 dm. tall, often strict, simple or branched; leaves petioled, linear; flowers in close clusters, these in dense interrupted spikes.—Along the railroad tracks. Intr. fromWest; it also occurs as a native occasionally in the high dunes.

8. C. **murale** L. (*Sowbane.*) A sprawling plant with thin, bright green, coarse, irregularly and sharply toothed leaves; spikes somewhat corymbiform, diverging.—Adv. from Eu. and established along railways of the Calumet District. Summer.

9. C. **Standleyanum** Aellen. Loosely branching, erect, 6-10 dm. tall; leaves narrow, acute; flowers solitary or in small clusters.—Occasional in the dunes, acc. to Pepoon. Summer.

3. ATRIPLEX L. Orach

Annual herbs with mealy pubescence or scurfy, bran-like scales; flowers in spiked clusters; sexes in different flowers, the female flowers consisting simply of a pistil enclosed between 2 leaf-like bracts which enlarge at fruiting time.

1. A. **patula** L. Plants 3-12 dm. tall, erect or prostrate, mealy or glabrous; leaves 2-10 cm. long, the upper linear or lanceolate, the lower sometimes opposite and narrowly hastate, petioled, sinuate-

dentate or entire; spikes slender.—A frequent plant in waste places and around cities, appearing introduced but probably native. Summer.

Some of the many leaf-variations are:

Var. **hastata** (L.) Gray. Stout, erect or spreading; lower leaves or all of them broadly triangular-hastate and often irregularly, coarsely toothed.—In brackish moist ground, frequent; also open subdunal meadows, rare.

Var. **littoralis** (L.) Gray. Slender; leaves linear-lanceolate to linear, rarely toothed.—In brackish moist ground, rare.

4. CORIOSPERMUM L. Bugseed. Tumbleweed

Low branching annuals with narrow, linear, alternate, 1-nerved leaves and slender spikes of perfect flowers; sepal only 1; stamens 1 or 2; styles 2; fruit sharp-margined, flat, oval, one face convex, the other concave.

1. **C. hyssopifolium** L. When young somewhat hairy and pale; leaves entire, awl-shaped, from a dilated base, or ovate and pointed and papery-margined; fruit with a marginal wing.—Along the beaches of Lake Michigan and in blowouts; a characteristic plant of our region in its habitat; sometimes in winter blowing about as a tumbleweed. September, October.

5. SALSOLA L. Russian Thistle

Herbs, or somewhat shrubby, much branched plants with fleshy leaves and perfect 2-bracted flowers in the axils; calyx 5-parted, its wing forming a papery border; stamens 5.

1. **S. Kali** L. var. **tenuifolia** G. F. W. Mey. Bushy-branching annual with filiform, stiffish, prickly leaves, and solitary flowers; calyx at first greenish, becoming purplish and converging over the fruit as a sort of beak, the wings of the fruit roundish, spreading, yellowish or lead-color. (*S. Tragus* of auths., not L.; *S. pestifer* A. Nels.)—A pernicious weed adv. from Asia and nat. across the Western States, spreading eastw. It forms tumbleweeds on the beaches of our area, and in vacant lots around cities. Often referred to as true *S. Kali* in writings on this flora, but the true species appears not to be present.

BUCKWHEAT FAMILY (Polygonaceae)

Herbs with entire alternate leaves and sheathing stipules (ocreae) or these obsolete; nodes swollen, bearing the stipules; flowers generally perfect, the calyx somewhat persistent; ovary with 2-3 styles or stigmas; stamens 4-12, inserted at the base of the 3-6-cleft calyx; fruit an achene which is generally compressed or 3-4-winged or -angled.

Calyx 6- (rarely 4-) parted; fruit or fruiting calyx broadly winged.
  Fruit much exserted from the scarcely enlarged calyx..... *Rheum* 9.
  Fruit almost enclosed by the enlarging calyx............ *Rumex* 8.

Calyx 5- (rarely 4-) parted; fruiting calyx winged broadly only in *Polygonella, Fagopyrum* and *Bilkerdykia.*

Leaves deltoid, sagittate, or hastate.

Stems not prickly; fruit much exserted from the slightly enlarging calyx.............................. *Fagopyrum* 6.

Stems prickly; fruit nearly enclosed by the enlarging calyx.................................... *Tracaulon* 4.

Leaves not deltoid, sagittate nor hastate.

Internodes of the stem and branches adnate; plant heath-like; leaves threadform-linear; calyx broadly winged; plant erect......................... *Polygonella* 7.

Internodes of the stems and branches not adnate; plant not heath-like; leaves linear or broader; calyx not broadly winged in fruit, or if so the plant twining.

Twining plants with ovate-heart-shaped leaves....... *Bilderdykia* 5.

Plants not twining.

Calyx 4-parted; flowers in long loose terminal spikes................................. *Tovara* 2.

Calyx 5-parted; flowers in rather dense spikes or axillary clusters.

Flowers in axillary fascicles or spicate with foliaceous bracts; leaves jointed on a very short petiole, adnate to the short sheath of the scarious, variously toothed ocreae; glabrous annuals........................ *Polygonum* 1.

Flowers in dense spikes with small scarious bracts; leaves not jointed on the petiole; sheaths truncate, entire or merely ciliate; calyx appressed to the fruit.................. *Persicaria* 3.

1. POLYGONUM L. Knotweed

Fibrous-rooted herbs with striate stems, ours glabrous annuals with flowers in axillary fascicles, or spicate, with leafy bracts; leaves and bracts jointed on a very short petiole, adnate to the short sheath of the 2-lobed or lacerate, scarious ocreae; calyx usually greenish, 5-6-parted; stamens 3-8, the inner filaments broad at base; styles 3. For the most part low-growing, inconspicuous plants, largely terrestrial.

The genus *Polygonum* is most often defined to include genera 2, 3, 4, and 5 following this, but nomenclatorial convenience has necessitated dividing it somewhat artificially.

Branches sharply angled............................... *P. tenue* 4.

Branches roundish.

Sepals white or roseate; plant prostrate................. *P. aviculare* 1.

Sepals greenish with yellow margins; plant erect or ascending.

Leaves elliptical, obtuse; achene dull................. *P. erectum* 3.

Leaves lanceolate, acute; achene shining.............. *P. ramosissimum* 2.

1. **P. aviculare** L. (*Doorweed.*) Prostrate or ascending, bluish green; leaves lanceolate, 6-20 mm. long; sepals small; achenes dull and striate, glandular.—Abundant homely plant in sandy fields, especially around towns. June-October.

Var. **arenastrum** (Bor.) Rouy. Prostrate; leaves rounded at apex, elliptical-obovate to broadly lanceolate, those on the branches crowded; whole plant green; achenes ovoid.—Sandy roadsides, Pine and perhaps elsewhere.

2. **P. ramosissimum** Michx. Erect or subascending; plants yellowish, with many branches; leaves 2-5 cm. long, lanceolate; outer sepals large, hooded.—Sandy shores, Lake and Porter Cos. An inconspicuous plant.

3. **P. erectum** L. Similar to the preceding (see key).—A homely weed of wayside and waste places.

4. **P. tenue** Michx. Stem angled, erect, wiry, 1.5-4 dm. tall; leaves with a depressed line on each side of the midnerve, lanceolate, 2-3 cm. long; flowers mostly solitary; achene dull and smooth.—A homely plant of dry sandy waste and dune shores, Whiting to Tremont and probably eastward. Summer.

2. TOVARA Adans

Perennials with slender interrupted spikes; calyx greenish-white, unequally 4-parted; stamens 5; styles 2, rigid and distinct and persistent on the smooth lentil-shaped achene.

1. **P. virginiana** (L.) Raf. Nearly smooth, 6-12 dm. tall, the stem flexuous and roundish; sheaths hairy and fringed, cylindrical; leaves rounded at the base, short-petioled, rough-ciliate, 7-15 cm. long, ovate or the upper ovate-lanceolate and taper-pointed; flowers curved, 1-3 together. (*Polygonum* L.)—Rare, in rich woods, notably along Dune Creek. Summer.

3. PERSICARIA Mill. Smartweed. Water-pepper

Roots fibrous; flowers in dense spikes with small scarious bracts; leaves not jointed on the petiole; sheaths cylindrical, truncate, entire, naked or ciliate-fringed; calyx petal-like, 5-parted, appressed to the fruit; stamens 4-8; filaments filiform. Plants for the most part growing in water, mud or moist soil.

Annuals with only emersed leafy shoots and no separate aquatic phase (perennials only in 5 and 6)	*Sect. Eupersicaria.*
Sheath not or practically not ciliate.	
Leaves scabrous on midrib and margin	*P. lapathifolia* 1.
Leaves glabrous beneath	*P. pennsylvanica* 2.
Sheaths bristly-ciliate.	
Stems and peduncles glandular-hispid	*P. Careyi* 4.
Stems and peduncles not glandular-hispid.	
Sepals dotted with dark glands.	
Achene dull; spikes drooping	*P. Hydropiper* 3.
Achene shining; spikes erect	*P. punctata* 5.
Sepals not dark-dotted.	
Spikes short, stout and compact	*P. mitis* 7.
Spikes long, slender and open	*P. hydropiperoides* 6.
Perennials with both aquatic and terrestrial emersed leafy shoots	*Sect. Potamocallis.*

Terrestrial emersed shoots bearing more or less pubescent foliage.	
Ocreae with spreading herbaceous tips, often bristly-margined	*P. fluitans* (terrestrial) 8.
Ocreae without spreading herbaceous tips.	
Leaves, especially the lower, narrow, linear, ribbon-like	*P. coccinea* var. 10b.
Leaves all broad-lanceolate to ovate.	
Leaves ovate to ovate-lanceolate	*P. coccinea* var. 10a.
Leaves ovate-lanceolate to narrowly lanceolate or even narrowly oblong	*P. mesochora* 9.
Aquatic shoots with floating leaves topped by an emersed terrestrial shoot with pubescent foliage	*P. grandifolia* 11.
Aquatic shoots with only glabrous slimy floating leaves.	
Leaves small, 5-10 cm. long, oval to narrowly elliptical, never cordate at base	*P. fluitans* (aquatic) 8.
Leaves larger, 7-15 cm. long, narrowly elliptical to ovate, often subcordate at the base	*P. mesochora* 9.
Leaves 8-20 cm. long, deeply cordate at base	*P. coccinea* var. 10a.
Leaves small, ovate to subcordate, 2.5-5 cm. long (aquatic, never flowering)	*P. coccinea* var. 10b.

Sect. EUPERSICARIA

1. **P. lapathifolia** (L.) S. F. Gray. (*Heartsease.*) Branching, glabrous annual, low or tall; leaves lanceolate, scabrous; spikes 1-5 cm. long, erect or nodding; flowers roseate. (*Polygonum* L.)—A variable plant of wet ground in the Calumet District. Summer.

2. **P. pennsylvanica** (L.) Small. Annual with lanceolate leaves, the upper branches glandular; flowers bright rose, on long pedicels; achene orbicular, smooth, generally concave, 2 mm. long. (*Polygonum* L.).—In wet ground, Clarke and elsewhere in the Calumet District, and eastward through the dune country along streams and ponds. Summer.

3. **P. Hydropiper** (L.) Opiz. (*Red-knees.*) Smooth annual, 3-6 dm. tall, with lanceolate leaves and greenish flowers; achene dull, minutely striate. (*Polygonum L.*)—A very peppery-tasting plant of lagoons, Miller, and perhaps elsewhere, its joints or "knees" reddish. Summer.

4. **P. Careyi** (Olney) Greene. Annual with erect stem 0.5-1.6 dm. tall, both stem and peduncle glandular-bristly with darkish hairs; leaves narrowly lanceolate, roughish; spikes nodding, loose, slender, purplish. (*Polygonum* Olney.)—A striking plant; in Dune Creek and perhaps sparingly westward to our borders. Summer.

5. **P. punctata** (Ell.) Small. Perennial with the stem 0.5-1.5 dm. tall, the leaves lanceolate; spikes dense, pedunculate; flowers white or flesh color; achene smooth and shining. (*Polygonum acre* HBK. not Lam.; *Polygonum* Ell.)—A plant rooting in the mud from the joints, the stems recumbent; in wet places throughout.

Var. **leptostachya** (Meisn.) Peattie. Erect annual or slightly creeping; leaves smaller, thinner, lighter in color; spikes elongated, loose.—Common in low swales between dunes and the Calumet District.

6. **P. hydropiperoides** (Michx.) Small. Perennial with smooth stems; spikes 3-6 dm. long, often interrupted, erect; flowers small, white or flesh color; achene sharply triangular, smooth and shining. (*Polygonum* Michx.; *Polygonum mite* Pers.)—A non-acrid, inconspicuous aquatic, Dune Park and probably elsewhere. Summer.

7. **P. mitis** Gilib. (*Lady's Thumb.*) Smooth and glabrous annual with roughish, oval-lanceolate leaves blotched with a dark lunar spot near the center; spikes ovoid or short-cylindric, dense, flowers white or pink; achene smooth and shining, triangular or flattened, with one projection. (*Polygonum Persicaria* L.; *Persicaria Persicaria* Small.) —One of the commonest of weeds, nat. from Eu. and found in fallow fields, roadsides and dooryards. Summer. There are numerous variations of leaf form and thickness and angle of stem; among them in our area is found:

Var. **ruderale** (Salisb.) Peattie. Stems prostrate, branching, forming mats; leaves often appressed-pubescent.—Roadsides, occasional throughout.

Sect. POTAMOCALLIS. Water Smartweed

Text contributed by Dr. J. A. Nieuwland

A group of amphibious plants, that has been variously treated, with many species and varieties and forms described from the different phases of the plants; compare the varying treatment in Gray's Manual, ed. 7, and House's "Flora of New York State"; a recent theory is that the various phases are all hybrids. Dr. Nieuwland has taken the attitude that the many different forms are ecological phases of a few complex and variable species.—*Peattie.*

Aquatic shoots having glabrous slimy leaves and more or less pubescent, emersed, aerial or terrestrial stems often from the same creeping rhizome; the xerophytic, more hairy, usually flowerless or sterile, riparian or intermediate phases variously resembling either aquatic or terrestrial phases, depending on the time of submersion or emersion. Inflorescence a dense, spike-like, terminal raceme of brightly rose-colored to crimson flowers in fascicles, subtended by similarly colored bracts. Rhizomes rooting at the nodes, whether floating or creeping underground. The plants are in typical state when both phases grow from the same rootstock.

8. **P. fluitans** (Eaton) Greene. *Aquatic phase:* Stems thin, wiry, long, slimy, in deep water; leaves all floating, slimy, long-stalked, the blades elliptical, rounded or obtuse at each end, usually deep red on the lower face, yellow to brownish yellow on the upper face, 5-10 cm. long, soon decaying when submerged, as they are succeeded by new ones; inflorescence usually rose red, conical, 2-3 cm. long in bud, the persistent calyx becoming darker red in fruit; bracts similarly colored. (*P. amphibia* of Am. auths. as to aquatic phase, but not L.; *P. Hartwrightii* Greene in part, including *P. vestita* Greene, in part; *P. asclepiadea* and *P. ammophila* Greene as to terrestrial phase.)

Distinguished in aquatic phase from *P. coccinea* var. *asprella* and *P. grandifolia* by the very small elliptical leaves which are never cordate.—Common in deep water of the Calumet River, also sloughs at Miller where it still retains its typical habitat. The most common of the group in the dunes, in both its phases.

Terrestrial phase: Leaves narrowly oblong to linear, seldom lanceolate-linear, not notably broader at the base than apex, but often gradually tapering to a blunt apex, subsessile or short-petioled, glabrous or pubescent or even densely hirsute, one and a half to two times as long as the leaves of the aquatic phase, their ocreae spreading into a salver- or funnel-shaped permanent tip 1-2 cm. broad with often bristly margins in hairy forms of the plant; inflorescence similar to the aquatic but usually 1 cm. longer. (*P. Hartwrightii* of Am. auth., *P. vestita* and *P. ammophila* Greene.)

Differing from *P. mesochora* in having the permanent spreading ocreae tips, narrower, more pubescent leaves, and a much shorter and thicker rose-colored inflorescence.—The commonest *Persicaria* of the dunes.

9. **P. mesochora** Greene. *Aquatic phase:* Plants similar to *P. fluitans*, but the leaves larger, cordate at the base, often truncate and broader at base than apex; deep water leaves not notably reddened, elliptical to elliptical-oblong; inflorescence deep red, narrow, longer than that of the preceding, often twice as long; stems thicker. (*P. Muhlenbergii* of herbaria and manuals, in part; *P. Hartwrightii* in part as to sterile spring shoots.)—A plant intermediate between *P. fluitans* and *P. Muhlenbergii*, not found in the dunes proper or in ponds with sandy margins, but in black muck soil in and around sloughs, Whiting to Tremont, as a terrestrial phase.

Terrestrial phase: Having the general aspect of a narrow-leaved form of *P. coccinea* but the leaves tapering to both apex and base, lanceolate, those of the spring shoots with spreading ocreae tips, thus often called "*P. Hartwrightii*"; spike longer than that of its aquatic phase, deep red; plant more or less pubescent though almost bare of hairs and roughened when growing in shade.—Found with the aquatic phase. Plant seemingly intermediate between *P. fluitans* and *P. coccinea* and usually mistaken for them. Distinguished from *P. coccinea* by its spreading ocreae tips in spring and from *P. fluitans* by the large size of the tips.

10a. **P. coccinea** (Muhl.) Greene var. **asprella** Greene. *Aquatic phase:* Leaves lanceolate-ovate or ovate, acute, cordate or subcordate at the base, glabrous, shining above, slimy beneath, never reddened, and in submerged parts thicker than in typical *P. coccinea* of the Eastern States; petioles slender, about ½ as long as the leaf-blades; spikes 1-3, of a deep red color, usually 4-7 cm. long; inflorescence alone immersed.—Abundant throughout.

Terrestrial phase: Glabrous or scabrous or strigose to appressed-muriculate, especially on the veins of the leaves; sterile xerophytic shoots especially rough-haired; spikes narrow, 7-9 cm. long, deep red to crimson; scales of the inflorescence and peduncle often white with appressed silky hairs. Never with spreading ocreae tips even in spring. (Incl. *P. pratincola* Greene.)—Abundant throughout.

10b. **P. coccinea** (Muhl.) Greene var. **tanaophylla** Nieuwl. *Aquatic phase:* Plants vestigial; leaves floating, glabrous or hairy, small, 2-8 cm. long, rooting in shallow water and apparently not flowering as an aquatic as it soon sends out aerial shoots with different foliage, thus differing from true *P. coccinea.* (*P. tanaophylla* Nieuwl.)

Terrestrial phase: Shoot from a creeping subterranean rhizome, rooting in wet soil, 7-12 dm. tall; leaves, especially the lower, very long and ribbon-like, and narrow, 14-22 cm. long, 1.5-2.5 cm. broad, narrower in the longer leaves, tapering to a blunt tip with a rounded or cuneate base; petiole 0.3-2.5 cm. long, with no trace of spreading ocreae tips, more or less silky-pubescent, becoming rough with appressed hairs when mature; spikes 1-2; plants continuing to bloom throughout the season by secondary shoots below the preceding inflorescence, forming a false axis.—A long trailing plant supported on shrubbery around marshes and streams, growing with the aquatic phase but always at maturity after the aquatic phase has disappeared.

11. **P. grandifolia** Greene. Terrestrial and aquatic phase combined on the same shoot, that is, the aquatic in deep water, the "terrestrial" or, more exactly, *aerial* foliage emersed.

Aquatic phase: Deep water plant several meters long, with fistulous submerged stems rooting from the old nodes and branching roots deep flesh- or rose-colored, plume-like, often 3 dm. long; internodes tapering, fistulous, especially the lower submerged ones; leaves ovate, lanceolate-ovate, deeply cordate, sometimes subsagittate, acute at apex, shiny, glabrous; petiole 7-10 cm. long; spikes 1-2, narrow, 3-9 cm. long, deep rose red or crimson; upper part of the stem always emersed several decimeters, and with terrestrial foliage strigose or hirtellous, always rough.

Terrestrial phase: Resembling that of *P. coccinea,* for which it is often mistaken; internodes swollen but scarcely fistulous; leaves nearly sessile, lanceolate, obtuse at base or subcordate, variously roughened to glabrous, deep green; plant not usually blooming as a true terrestrial unless stranded by receding water.—Shores of Calumet River, also sloughs at Miller, associated with *P. fluitans.*

4. **TRACAULON** Raf. Tear-thumb

Climbing or reclining annuals with fibrous roots, armed with retrorse prickles on the angles of the stems and petioles; flowers in loose, long, naked spikes, greenish or rose-colored; stamens 6-8; styles 3; ocreae oblique, fringed at the base with a few cilia and prickles.

Leaves halberd-shaped, long-petioled; stamens 6; styles 2; achene lenticular.	*T. arifolium* 1.
Leaves arrow-shaped, short-petioled; stamens 8; styles 3; achene triangular.	*T. sagittatum* 2.

1. **T. arifolium** (L.) Raf. Stems grooved; leaves long-petioled; peduncles bristly. (*Polygonum* L.)—Rather infrequent, climbing or sprawling over bushes and herbs, Tamarack Station and perhaps elsewhere. Summer.

2. **T. sagittatum** (L.) Small. Stems 4-angular, slender, prickles only on the stem angles and midnerves of the leaves. (*Polygonum* L.)—In low swampy woods and grassy swales. Frequent among the high dunes and occasional in the Calumet District.

5. BILDERDYKIA Dumort. Bindweed

Glabrous trailing or climbing herbs, twining by the coiling of their unarmed stems; flowers greenish, pendulous in panicled racemes; calyx 5-parted; stamens 8; styles 3.

Annual, roughish; achene minutely roughened, dull black . . .	*B. Convolvulus* 1.
Perennial, smooth; achene smooth, shining black	*B. dumetorum* 2.

1. **B. Convolvulus** (L.) Dumort. (*Black Bindweed.*) Roughened with scales; joints naked; racemes corymbose, interrupted, small, greenish; outer calyx lobes keeled. (*Polygonum* L.; *Helxine* Raf., *Tiniaria* Webb.)—A pest in agricultural ground and along roadsides generally throughout our area in its habitats. Nat. from Eu. Summer.

2. **B. dumetorum** (L.) Dumort. (*Climbing False Buckwheat.*) Similar to the preceding, stouter, the outer calyx lobes, especially on the fruit, very strongly keeled, appearing like wings on the fruit; achene 2.6-3 mm. long.—A curious but rather handsome plant, rampant over tall bushes. In low woods along Dune Creek, also at Clarke, and perhaps elsewhere in moist thickets. (*Polygonum* L.; *Helxine* Raf; *Tiniaria* Opiz.)

6. FAGOPYRUM Hill. Buckwheat

Annuals with corymbs of racemes; calyx petal-like, 5-parted; stamens 8; styles 3; stigmas capitate; achene 3-sided.

1. **F. esculentum** Moench. Stems long, climbing or trailing, smoothish; flowers white, greenish, or rose color, with 8 nectariferous yellow glands between the stamens; achene acute, entire, shining, smooth. (*F. Fagopyrum* Karst.; *F. vulgare* Hill; *Helxine* Kuntze.)—Field crop, native of Europe, frequently persisting after cultivation in the Calumet District. June-September.

7. POLYGONELLA Michx.

Slender glabrous annuals, in our species, with linear, alternate leaves jointed at the base; flowers on solitary pedicels jointed near the base, borne in slender panicled racemes; calyx 5-parted, petal-like, loosely persistent about the achene, enlarging in fruit; stamens 8; styles 3; achene 3-angular.

1. **P. articulata** (L.) Meisn. Stem 1-3 dm. tall, branching, glaucous, the leaves very slender, deciduous, often appressed to the stem; flowers nodding, rose-color or white, tiny but gleaming; achene exserted from the calyx, smooth.—A curious little plant growing in open, blowing sand of the high dunes from Miller eastward; especially

abundant on Mt. Tom. Also found along railroads and in sandy wastes of the northern Calumet District. September, October.

8. RUMEX L. Dock. Sorrel

Coarse more or less weedy herbs with inconspicuous greenish flowers in panicled racemes and petioles sheathing at the base; outer sepals greenish, united at base, the inner larger and somewhat colored and petaloid, becoming valves which converge over the 3-angled achene, often veiny and granular; stamens 6; styles 3; stigmas tufted.

- Leaves halberd- or arrow-shaped........................ *R. Acetosella* 6.
- Leaves not halberd- or arrow-shaped.
  - Pedicels club-shaped, deflexed........................ *R. verticillatus* 4.
  - Pedicels threadform, curved or flexuous.
    - Leaves crisped or wavy-margined.
      - Stem smooth................................ *R. crispus* 2.
      - Stem rough................................ *R. obtusifolius* 5.
    - Leaves flat.
      - Pedicels with swollen joints, rarely exceeding the yellow or brown calyx........................ *R. altissimus* 3.
      - Pedicels obscurely jointed, mostly exceeding the ultimately purplish calyx...................... *R. Britannica* 1.

1. **R. Britannica** L. (*Water Dock.*) A tall stout plant with acute, oblong-lanceolate, transversely veined leaves, the margins only obscurely crenulate; racemes erect; panicles large, compound, leafless, their whorls crowded; inner fruiting sepals finely reticulate, all bearing granules.—In swampy ground among the dune meadows and in the Calumet District, rare. Summer.

2. **R. crispus** L. (*Curly Dock.*) Rootstocks reddish brown, bitter, tanniferous; leaves lanceolate, acute; whorls crowded on wand-like racemes which are leafless at last at the summits; pedicels with swollen joints; inner fruiting sepals bearing plump granules.—A common weed, adv. from Eu.; around towns, and in cultivated fields.

3. **R. altissimus** Wood. (*Pale Dock.*) Tall, with pale, thick, obscurely veiny, acute, ovate-lanceolate leaves; racemes panicled, nearly leafless; whorls crowded, pedicels nodding; inner fruiting sepals loosely reticulate, one of them bearing a conspicuous granule.—In low grounds of the Calumet District.

4. **R. verticillatus** L. (*Swamp Dock.*) Tall; leaves oblong-lanceolate, pale green, thickish, obtuse; racemes nearly leafless, elongated, loose, the upper whorls crowded; fruiting pedicels 3-4 times as long as the calyx; inner fruiting sepals strongly rugose-reticulated, each bearing one very large granule.—In swamps of the Calumet District and low meadows among the high dunes, infrequent.

5. **R. obtusifolius** L. (*Bitter Dock.*) Lower leaves rather downy on the veins beneath, ovate-heart-shaped, obtuse, the upper acute, oblong-lanceolate; whorls loose and distant; inner fruiting sepals strongly reticulated.—Weed of European origin, Tamarack Sta., and in the urban districts of the Calumet District.

6. **R. Acetosella** L. (*Sheep Sorrel.*) Low, freely spreading by rootstocks; racemes slender, loosely flowered; pedicels jointed at the summit; sepals exceeded by the achene, scarcely enlarged in fruit. —A common weed, nat. from Eu. and found around cities, fallow fields, etc. It has a pleasantly acid taste, and blooms from early spring to late autumn.

9. RHEUM L. Rhubarb

Leaves mostly basal, large, on stout thick petioles; stems tall; white flowers in panicled fascicles or racemes; stamens 9 or 6.

1. **R. Rhaponticum** L. (*Garden Rhubarb.*) Leaves thick and heavy, wavy-margined, palmately about 5-ribbed, deeply cordate at base; panicles narrow, densely flowered; pedicels jointed below the middle.—Cultivated plant, intr. from Eu., escaped cult. in the Calumet District. Summer.

POKEWEED FAMILY (Phytolaccaceae)

Our species herbs with alternate entire leaves and perfect flowers without petals, the sepals petal-like; fruit a berry; in other respects largely resembling the *Chenopodiaceae.*

1. PHYTOLACCA L. Pokeweed

Tall stout perennials with large petioled leaves and terminal racemes which become lateral and opposite the leaves as the stalk elongates; calyx of 5 petal-like sepals; stamens 5-30; ovary of 5-12 carpels with as many short styles; fruit a 5-12-seeded berry.

1. **P. americana** L. Root very large; stem smooth, succulent, 2-3 m. tall; calyx white; stamens and styles 10; ovary green; flowers in large drooping racemes; fruit dark purple. (*P. decandra* L.) —Infrequent in our area, near roadsides, farms, and suburban districts. The root is very poisonous; when young the plants are eaten like spinach and are very excellent but as soon as the purplish color appears in the stem all parts of the plants are toxic. Early summer.

FOUR-O'CLOCK FAMILY (Nyctaginaceae)

Our species herbs with mostly opposite entire leaves; stems swollen at the joint and flowers with delicate, tubular, often colored and petal-like calyx which surmounts the one-celled, one-seeded ovary; stamens few. There is frequently a cup-like involucre just below the flower which appears like a calyx, while the calyx is apt to be mistaken for a corolla.

1. OXYBAPHUS L'Her. Wild Four-o'clock

Roots large and thick; flowers clustered, small, 3-5 in the same 5-lobed broad open cup-like involucre which in fruit is enlarged, thin and veiny; calyx with a short tube and bell-shaped rose or purple limb; stamens 3 (or 5); style filiform; fruit achene-like, ribbed and angled.

Leaves all petioled except the reduced uppermost ones......	*O. nyctagineus* 1.
Leaves sessile or nearly so..............................	*O. albidus* 2.

1. **O. nyctagineus** (Michx.) Sweet. Stem 0.3-1.5 m. tall, straggling, repeatedly forked, almost smooth; leaves heart-shaped and broadly ovate or ovate-lanceolate and cuneate at base; lower flowers axillary, the upper crowded on short floral axes; involucres 2 cm. broad, showy. (*Allionia* Michx.)—A weedy but rather handsome plant in flower, occurring in native state rather rarely in our area on low sandy ridges beneath oaks in the Calumet District; also rather frequently an introduced plant of the railroad tracks and roadsides. As a native plant, this western species reaches an eastern limit here. June, July.

2. **O. albidus** (Walt.) Sweet. Stem whitish; leaves long-oblong, obtuse; flowers few and axillary or numerous in a narrow terminal panicle. (*Allionia* Walt.; *A. lanceolata* Rydb.)—Nat. from the Great Plains along railroad tracks, Michigan City and probably also in the urban regions of the Calumet District.

CARPET-WEED FAMILY (Molluginaceae)

Herbs with opposite leaves without stipules, similar to the *Silenaceae* but petals none, and capsule and ovary 2-several-celled; sepals 5; stamens 5, alternate with the sepals, or 3; stigmas 3; capsule 3-celled, the partitions breaking away from the main axis.

1. MOLLUGO L. Carpet-weed

Having the characters of the family.

1. **M. verticillata** L. A low, prostrate, much-branched weed, often forming extensive mats; leaves clustered in whorls at the joints, spatulate; pedicels 1-flowered, umbellately clustered at the nodes; sepals white inside.—Roadsides, waste ground, or on the shores of Lake Michigan or on dry dunes abundantly as at Mt. Tom, usually said to be nat. from the Southern States, but possibly native.

PORTULACA FAMILY (Portulacaceae)

Herbs with succulent entire leaves and regular flowers; sepals 2; petals 5 or none; stamens 5-20; styles 2-8, united below or distinct; pods 1-celled, many seeded.

Leaves practically basal; stamens inserted on the petals; pods 1-celled, few-seeded............................	*Talinum* 2.
Leaves on the stem.	
Leaves long, slender, acute, few; stamens inserted on the petals; pod 3-celled, many-seeded................	*Claytonia* 1.
Leaves short, round, blunt, fairly numerous; stamens inserted on the calyx; pod 1-celled, many-seeded.....	*Portulaca* 3.

1. CLAYTONIA L. Spring Beauty

Perennials with simple stems and small tubers, a pair of opposite leaves and a loose raceme; sepals free from the ovary, persistent; style 3-cleft; stamens 5.

1. **C. virginica** L. Low-growing, delicate, smooth plant with long slender leaves and a few flowers; petals rose-pink with darker veins, fragile, short-lived.—A pretty little flower infrequent in our area; found under oaks on old beach ridges, on prairies and in rich dune woods. Early spring.

2. TALINUM Adans. Fame Flower

Perennials from a thickish rootstock, with linear leaves almost round in cross-section, practically basal; flowers in cymes, ephemeral; sepals distinct, free from the ovary, deciduous; stamens 5 to many; style 3-lobed.

1. **T. rugospermum** Holzinger. Biennial, low growing, slender but fleshy; petals 5, roseate, about 8 mm. long; stamens 15-20; anthers short, spherical; stigma lobes ¼ as long as the style; seeds roughened.—Infrequent; rather attractive little flower of prairies and rich thickets of the Calumet District. Summer.

3. PORTULACA L. Purslane

Fleshy annuals with mostly scattered leaves and solitary flowers; calyx tube adhering to the ovary; petals 5 or 6, inserted on the calyx, ephemeral; stamens 7-20; style 3-8-parted; pod opening by a lid at the top.

1. **P. oleracea** L. ("*Pusley.*") Prostrate, smooth; leaves obovate; flowers sessile; petals pale yellow; stamens 7-12; style deeply 5-6-parted.—A common barnyard and urban weed, formerly cultivated as a pot or salad herb. Flowers (in summer) infrequently seen because they open only for a few hours in bright sunlight. Intr. from Eu., and perhaps also nat. from West and South, where native.

PINK FAMILY (Silenaceae)

Herbs with mostly opposite and entire leaves and symmetrical 4-5-merous flowers with or without petals, the stamens fewer, as many as, or twice as many as the petals; styles 2-5 or rarely united; fruit a pod or utricle, 1- or many-seeded. (*Caryophyllaceae*, and including *Illecebraceae* of some works.)

Stamens inserted on the calyx; stipules present; fruit a small 1-seeded bladder.................................. *Anychia* 1.

Stamens not on the calyx; stipules none; fruit a few- to many-seeded pod.

  Low herbs with distinct sepals; petals when present without claws; stamens inserted at the base of the ovary; styles separate to the base; corolla generally cup- or saucer-shaped.

Pod ovoid; styles usually 3.
Petals entire.................................. *Arenaria* 2.
Petals notched or bifid........................... *Stellaria* 3.
Pod cylindric; styles usually 5...................... *Cerastium* 4.
Taller herbs with mostly showy flowers; sepals united below into a tube; petals, when present, clawed; stamens often adhering to the claws, generally inserted on the stalk of the ovary; corolla generally salver-shaped.
Styles 2; calyx only faintly nerved, roundish or 5-angled. *Saponaria* 5.
Styles 3 or more; calyx strongly 10-nerved.
Styles 3.. *Silene* 6.
Styles 5.
Styles opposite the unappendaged petals.......... *Agrostemma* 7.
Styles alternate with the often appendaged petals.. *Lychnis* 8.

1. ANYCHIA Michx. Forked Chickweed

Small, repeatedly forked annuals with minute flowers in the forks and small papery stipules; sepals 5; petals none; stamens 2 or 3, rarely 5; stigmas 2, sessile; bladdery fruit larger than the calyx.

1. **A. canadensis** (L.) BSP. Smooth, low growing but erect, slender; leaves 1-3 cm. long; inflorescence diffuse. (*A. dichotoma* Michx.)—In dry woodlands and black oak woods around East Gary and Dune Park. Midsummer.

2. ARENARIA L. Sandwort

Low, usually tufted plants with sessile leaves and small white flowers, or petals none; stamens 10; pod short, splitting into as many valves as there are styles, or into twice as many.

Leaves awl-shaped and bristle-form...................... *A. stricta* 3.
Leaves broader, ovate, oval, or oblong.
Sepals half as long as the petals; leaves obtuse........... *A. lateriflora* 1.
Sepals about as long as the petals; leaves acute.......... *A. serpyllifolia* 2.

1. **A lateriflora** L. Low; sparingly branched and minutely pubescent; leaves oval or oblong; peduncle 2-flowered; seeds with an appendage at the hilum. (*Moehringia* Fenzl.)—Occasional on wooded dunes and in oak woods, Miller, Clarke. May, June.

2. **A. serpyllifolia** L. Rather rigid, branched, pubescent, 5-15 cm. tall; leaves small, ovate; flowers in leafy cymes; seeds naked at the hilum.—Occasional around cities in the Calumet District. Nat. from Eu. June-August.

3. **A. stricta** Michx. Diffusely spreading from a small root, or erect; leaves often fascicled; cyme diffuse, leafless, many-flowered; seeds rough but naked at the hilum. (*A. Michauxii* Hook.; *Alsine Michauxii* Fenzl, *Alsinopsis stricta* Small, *Minuartia Michauxii* House.)—Rather a pretty little plant of oak and pine barrens, chiefly in the Calumet District. July.

3. STELLARIA L. Starwort. Chickweed

Sepals 4-5; petals white, 4-5 or none; stamens 10 or fewer; pod one-celled, several-many-seeded, opening by twice as many valves as there are styles. Flowers solitary or cymose, terminal or appearing lateral by a prolongation of the stem. Seeds naked. Ours inconspicuous weeds chiefly of grassy places.

Stems and flower-stalks glabrous.	
Leaves linear or nearly so; inflorescence lateral	*S. longifolia* 1.
Leaves lanceolate or broader; inflorescence terminal	*S. graminea* 2.
Stems and flower-stalks pubescent	*S. media* 3.

1. **S. longifolia** Muhl. Stem weak, erect, angles generally roughened; cymes scaly-bracted, peduncled, many-flowered; pedicels spreading or deflexed, slender; petals longer than the calyx. (*Alsine* Britton.)—In swamps and wet swales around lakes and ponds, in tall grass, occasional throughout, especially prairies near Dyer. June, July.

2. **S. graminea** L. Stems weak, ascending or reclining, 3-5 dm. long, rhombic in cross-section; leaves ciliate at base, narrowly lanceolate; inflorescence pedunculate, terminal, many-flowered, diffuse; seeds minutely roughened. (*Alsine* Britton.)—In grassy places, sporadically occurring in the western part of our range. Nat. from Eu. Summer.

Var. **latifolia** Peterm. has ovate leaves, the lowest petioled.

3. **S. media** (L.) Cyrill. (*Common Chickweed.*) Low diffuse annual, the stem hairy in lines; leaves ovate; petals shorter than the calyx; stamens 3-7; seeds scarcely roughened. (*Alsine* L.)—A common lawn weed, also farmyards and city streets. Nat. from Eu. Spring to fall.

4. CERASTIUM L. Mouse-ear Chickweed

Our species hairy low-growing weeds with the petals shorter than the sepals or none and with herbaceous bracts; seeds rough. Petals 2-cleft or rarely entire; stamens 10 or fewer; styles 5 or rarely 4 or 3, opposite the sepals; pod 1-celled, elongate, often curved, opening at top by twice as many teeth as styles; seeds numerous, roughened minutely.

1. **C. vulgatum** L. Low, simple or slightly branching, hirsute; leaves 3-7 pairs, oblong to narrowly oval, hirsute on both surfaces; bracts similar but smaller; cymes very dichotomous, at first congested; petals often absent; fruiting pedicels divergent or reflexed.—Common weed of roadsides and lawns, blooming throughout the season. Nat. from Eu.

5. SAPONARIA L. Soapwort

Rather coarse plants with mucilaginous juice; calyx narrowly ovoid, 5-toothed; stamens 10; pod 4-toothed at apex.

Calyx roundish; petals crowned with an appendage at the top of the claw.................................... *S. officinalis* 1.
Calyx 5-angled; petals not appendaged.................. *S. Vaccaria* 2.

1. **S. officinalis** L. (*Bouncing Bet.*) Stout perennial with corymbed clusters of pink or white, slightly fragrant flowers; leaves oval-lanceolate; flowers often double.—Roadsides, city streets, etc., common throughout even on sand dunes. Intr. from Eu., and escaped from gardens. A pretty weed of which the saponaceous juice mixed with water makes soapsuds. June-September.

2. **S. Vaccaria** L. (*Cow Herb.*) Annual with ovate-lanceolate leaves and flowers in corymbed cymes; petals pink. (*Vaccaria* Britton.) —Handsome waif intr. from Eu., occasional around grain elevators of the Calumet District. Summer.

6. SILENE L. Campion. Catchfly

Flowers solitary or cymose; calyx 5-toothed, 10-nerved; stamens 10; petals often with a crown or scale at the top of the claw; pod 1-celled, opening at the apex.

Calyx not inflated, except by the enlarging pod.
  Flowers panicled, small; stem glabrous but each joint sticky.................................... *S. antirrhina* 1.
  Flowers cymose, large; stem pubescent and sticky........ *S. noctiflora* 2.
Calyx bladdery-inflated; plants perennial; flowers panicled, white.
  Leaves in whorls of 4; petals fringed.................... *S. stellata* 3.
  Leaves opposite; petals merely 2-cleft.................. *S. latifolia* 4.

1. **S. antirrhina** L. (*Sleepy Catchfly.*) Annual; stem 2-9 dm. tall, slender, leafy, the leaves linear or lanceolate; calyx ovoid; petals obcordate, white or pink, minutely crowned, scarcely longer than the calyx.—The flowers open for a short time in bright sunshine and then close. The sticky nodes entrap many insects and commonly the minutely roughened seeds of this plant may be found stuck in its own insect trap. Common in sandy open soil and waste places throughout, but especially the high dunes. July-September.

Var. **divaricata** Robinson. Very slender, the threadlike branches and peduncles widely spreading; petals none.—With the type.

2. **S. noctiflora** L. (*Night-flowering Catchfly.*) Stem 3-9 dm. tall; the lower leaves spatulate, large, the upper lanceolate; flowers few, the calyx tubular, veined with purple; petals obcordate, 2-notched, distinctly exceeding the calyx.—In cultivated ground, Tremont and Clarke. Resembles *Lychnis alba* but has 3 styles. Nat. from Eu. The flowers open only at night and remain open in early morning, then close. Summer.

S. virginica L. (*Fire Pink*) has been reported from our region but in error, or it has become extinct.

3. **S. stellata** (L.) Ait. var. **scabrella** Nieuwl. (*Starry Campion.*) Stem somewhat rigid, 7-10 dm. tall, with a large and open pyramidal panicle; leaves ovate-lanceolate, the margins scabrous-ciliate; calyx

bell-shaped; corolla 2 cm. broad, not crowned, the tip of each petal deeply and finely lacerate.—In rich cool woods around Michigan City. Rare in our area. Summer.

4. **S. latifolia** (Mill.) Britten & Rendle. (*Bladder Campion.*) A glaucous plant with ovate-lanceolate leaves and much inflated globular calyx which is elegantly veined; petals conspicuous.—A European weed, in waste ground throughout. Summer.

7. AGROSTEMMA L. Corn Cockle

Tall silky annual or biennial weeds with linear leaves, the calyx with elongate teeth; petals large, unappendaged; stamens 10; capsule 1-celled.

1. **A. Githago** L. (*Corn Cockle.*) 3-9 dm. tall, simple or with few branches, whitish-pubescent throughout with appressed hairs; calyx ovoid, its teeth 2-3 cm. long; petals purplish-red, paler towards the claw and spotted with black; flowers 2.5-4 cm. broad. Seeds black, poisonous.—A weed in grain fields. Nat. from Eu., also found in waste ground. Summer.

8. LYCHNIS L. Campion. Lychnis

Similar to *Silene;* styles 5, rarely 4; pod opening by as many or twice as many teeth as styles. Our species somewhat showy and weedy plants, with petals appendaged at the throat with a little crown or scale.

Flowers in dense hemispherical clusters, scarlet............	*L. chalcedonica* 1.
Flowers in loose cymes or solitary, white..................	*L. alba* 2.

1. **L. chalcedonica** L. (*Scarlet Lychnis.*) 6-12 dm. tall, more or less hairy, perennial; leaves ovate or more slender, upper sometimes clasping; flowers perfect; calyx slender, ribbed; petals deeply bifid at tip.—Showy cultivated plant of uncertain origin, probably Asiatic, nat. in Calumet District. Summer. "London Pride" is probably a cultivated variation.

2. **L. alba** Mill. (*White Campion.*) Loosely branching, hairy (sometimes sticky) plant (annual[?]), with inflated calyx strongly ribbed, the ribs red-brown or purplish; calyx teeth long-attenuate; petals obcordate; sexes partially or wholly on separate plants. —Blossoms opening in the afternoon or evening or by day in shade, full-blown and fragrant at night. Resembling *Silene noctiflora* but has 5 styles. Adv. in waste ground, from Old World. June, July.

HORNWORT FAMILY. (Ceratophyllaceae)

Aquatic herbs with finely dissected, whorled leaves and minute axillary flowers, the sexes in different flowers on the same plant; calyx and corolla none, replaced by an 8-12-cleft, calyx-like involucre.

1. CERATOPHYLLUM L. Hornwort

Submerged water plants with 3-forked sessile leaves cut into rigid divisions and sterile flowers of 10-20 stamens with large sessile anthers; female flowers consisting of a 1-celled, 1-ovuled ovary; fruit an achene beaked with the slender style.

1. **C. demersum** L. Fruit with a short spine or tubercle on each side at the base, smooth, marginless; style long.—Rare, in the slow waters of the Calumet River.

WATER-LILY FAMILY (Nymphaeaceae)

Aquatic herbs with rootstocks horizontal; leaves floating or sometimes standing out of water, with shield-shaped or heart-shaped blades. Flowers axillary, solitary, of few to many petals and sepals, when many the perianth arranged in indefinite rows and merging sepals into petals and petals into petal-like stamens, when few, the sepals and petals each 3 or 4; ovaries few and definite, or many and indefinite, superior.

Sepals and petals numerous in several rows, passing gradually into each other; fruit a woody receptacle, the seeds imbedded in its crateriform pits....................	*Nelumbo* 1.
Sepals 4-6, not numerous.	
Petals numerous in several rows; fruit a many-seeded berry.	
Petals very small and stamen-like, inserted with the stamens under the ovary; flowers yellow........	*Nymphozanthus* 2.
Petals large, adnate to the ovary; stamens on the summit of the ovary; flowers white or pink............	*Nymphaea* 3.
Petals 3 or 4; fruit a few-seeded carpel.................	*Brasenia* 4.

1. NELUMBO Adans. Lotus

Rootstock tuberous; leaves large, attached in the center, beneath, to their long stalks; flowers solitary, large; sepals and petals passing gradually into the stamens; perianth and stamens all deciduous and attached under the ovary; pistils several, imbedded in the top-shaped receptacle which enlarges in fruit.

1. **N. lutea** (Willd.) Pers. (*American Lotus.*) Leaves floating or raised as much as five feet out of water, very broad, nearly circular, the center depressed or cupped, bluish underneath, dark green above; flowers as much as 3 dm. broad, pale yellow fading white.—A magnificent species, with edible rootstocks and seeds, which has been nearly exterminated by picking. It grew formerly in Wolf Lake and is still found in the waters of the Grand Calumet. The flowers on the first day are open only from dawn to sunrise; the second day and the third they are open longer, and by the fourth they stay open till dusk, when the petals drop off. The dry pod breaks off and floats, head downward, on the water, till decay loosens the large black seeds which sink to the bottom of the water. The plant often grows in water six feet deep. Flowers in summer.

2. NYMPHOZANTHUS L. C. Rich. Yellow Pond-lily

Rootstock creeping; leaves attached at the deep basal sinus to their long stalks; flowers yellow or purplish, solitary on long scapes; sepals 5 or more, rounded and concave, passing gradually to the similar petals which are stamen- or scale-like and small, thick and numerous; stamens short; stigma radiate, as in the poppy, 6-24-rayed; fruit pulpy, ovoid, ripening above water. Flowers closed at night.

Leaves with short rounded basal lobes which close the sinus; flowers partly purple..............................	*N. variegatus* 2.
Leaves with triangular lobes and broadly open sinus; flowers wholly yellow..................................	*N. advena* 1.

1. **N. advena** (Ait.) Fernald. (*Cow-lily.*) Leaves generally borne erect out of the water (submersed leaves rarely present), roundish to ovate or almost oblong, thick, 1.5-3 dm. long; sepals 5, yellow tinged with green or brown, unequal; petals truncate; stigma nearly entire, globose-truncate, yellow or pink, 12-24-rayed; ovary and fruit 3.5-5 cm. long. (*Nymphaea* Ait.; *Nuphar* Ait. f.)—Common in quiet water of lakes, rivers, ponds, especially abundant on Wolf Lake. Summer.

2. **N. variegatus** (Engelm.) Fernald. (*Spatter-dock.*) Similar to the preceding, but with leaves floating or less often emersed. (*Nymphaea advena* var. Fernald; *Nuphar* Engelm; *Nymphaea* G. S. Miller; *Nymphaea americana* Miller & Standley.)—Less common than the preceding, Wolf Lake and perhaps elsewhere. Summer.

3. NYMPHAEA L. Water-lily

Rootstocks horizontal; leaves floating, attached to the apex of the sinus; flowers solitary on long naked stems; sepals 4, green outside; petals in many rows, numerous, passing gradually into the indefinite number of stamens; both petals and stamens inserted all over the ovary, which is capped by a globular central projection around which are the stigmas (radiate as in poppy). Fruit pulpy, depressed-globular, ripening under water and covered with the decayed petals.

Leaves prominently ribbed; flowers 1-2 dm. broad, scentless (or with a slight odor of apples); seeds globular-ovoid.	*N. tuberosa* 1.
Leaves not prominently ribbed; flowers 0.5-1.3 dm. broad, very fragrant; seeds ellipsoid......................	*N. odorata* 2.

1. **N. tuberosa** Paine. (*White Water-lily.*) Rootstock with numerous self-detaching tubers; leaves reniform-orbicular, 2-4 dm. wide, sometimes purplish beneath; flowers pure white, the petals relatively broader and blunter than in the following; fruit depressed, with fewer much larger seeds which when mature are barely enclosed by the aril and not stipitate. (*Castalia* Greene.)—A beautiful flower, with often very long stems. In quiet water, Miller, Dune Park, Wolf Lake and the Grand Calumet, and lagoons near the Lake at Pine. Summer.

2. **N. odorata** Ait. (*Fragrant Water-lily.*) Rootstock with a few persistent branches; leaves roundish, with deeply cordate sinus, 5-20 cm. long, often red beneath; flowers white or rarely pinkish, opening in

morning only; petals obtuse; seeds stipitate, much shorter than the aril. (*Castalia* Woodville & Wood.)—Rare, in quiet waters of Wolf Lake, and sparingly eastward in ponds through the high dune country. Summer.

4. BRASENIA Schreb. Water Shield

Rootstocks creeping; leaves long-petioled, oval, floating, centrally attached beneath. Flowers axillary; sepals and petals 3 or 4, the latter linear; stamens 12-18, filaments threadform; pistils 4-18; stigmas linear; fruit a small club-shaped 1-2-seeded pod.

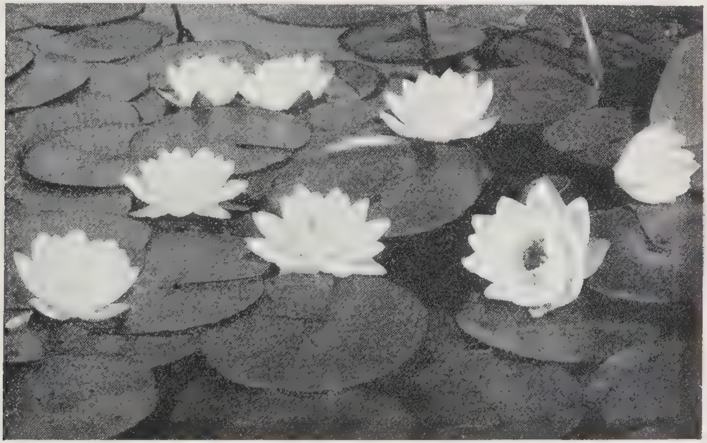


FIG. 13. WHITE WATER-LILY (*Nymphaea tuberosa*)

1. **B. Schreberi** Gmel. Leaves entire or with rounded shallow teeth, 2-10 cm. broad; flowers dull purple, floating at the surface. (*B. peltata* Pursh.)—In shallow waters and bays, Wolf Lake, the Grand Calumet, and lagoons at Pine, near the Lake. Rare among ponds of the high dune country. Summer.

BUTTERCUP FAMILY (Ranunculaceae)

Our species herbs with colorless acrid juice and leaves often dissected, their stalks dilated at the base, sometimes with stipule-like appendages; sepals 3-15, sometimes green or if petal-like, then the petals none; petals if present few or several, often irregular, or consisting of modified stamens; stamens indefinite, mostly numerous; fruit either a dry pod, or seed-like achene, or berries.

Many of the *Ranunculaceae* are very poisonous and most have a biting taste. The larkspur, *Delphinium*, is not included here, but acc. to Benke *D. tricorne* Michx. was found at Miller in 1913. Perhaps it was adventive.—ED.

- Petals and sepals both present (sepals early deciduous in 2 and 3, petal-like in 4).
  - Flowers in racemes.................................... *Actaea* 2.
  - Flowers not in racemes.
    - Petals flat, regular.................................... *Ranunculus* 9.
    - Petals curled into a hollow tube or spur.
      - Petals club-shaped, small, not spurred.................... *Coptis* 4.
      - Petals produced backward into a hollow spur, not club-shaped, large.......................... *Aquilegia* 3.
- Petals lacking, the sepals frequently resembling the petals; a calyx-like involucre is sometimes present.
  - Leaves alternate.................................... *Thalictrum* 10.
  - Leaves all basal or the upper at least opposite or whorled.
    - Plants climbing.................................... *Clematis* 8.
    - Plants not climbing.
      - Aquatic or mud plants with yellow flowers.......... *Caltha* 1.
      - Terrestrials with white, blue, or roseate flowers.
        - Involucre (resembling sepals; sepals petal-like) close to the flower.......................... *Hepatica* 5.
        - Involucre (leaf-like) remote from the flower, subtending the peduncle or pedicels.
          - Roots tuberous; whole plant glabrous .... *Anemonella* 6.
          - Roots fibrous; plants more or less hairy......... *Anemone* 7.

1. **CALTHA** L. Cowslip. Marsh Marigold

Succulent glabrous perennials with round or kidney-shaped leaves; flowers solitary on axillary peduncles; sepals 5-9, petal-like; pistils 5-10 with almost no styles. Fruit a compressed, many-seeded pod.

1. C. palustris L. Stem hollow, furrowed; leaves crenate or dentate or subentire, thickish; sepals bright yellow, broadly oval.—Occasional in shallow water or alluvial mud, Dune Creek, flood plains of Deep River, etc. April-June. The early leaves often eaten as greens.

2. **ACTAEA** L. Baneberry

Perennials with 2-3-ternately compound large leaves, the ovate leaflets sharply cleft; raceme thick, terminal, few-flowered; flowers white; sepals 4 or 5, falling off at expansion; petals 4-10, flat, spatulate, clawed, small; stamens numerous with slender white filaments; pistil 1; stigmas sessile, depressed, 2-lobed; berries poisonous, with 2 rows of flattened seeds.

1. A. alba (L.) Mill. Tall plant with deeply incised and sharply toothed leaflets; racemes elongated; petals slender, stamen-like; pedicels in fruit red and thickened; berries white.—In rich dune woods, especially east of Michigan City. Early spring.

3. AQUILEGIA L. Columbine

Perennials with 2-3-ternately compound leaves and lobed leaflets and showy solitary flowers terminating the branches; sepals 5, regular, petal-like; petals with a short spreading lip, much longer than the calyx; pistils 5, with slender tips; fruit of several erect many-seeded pods.

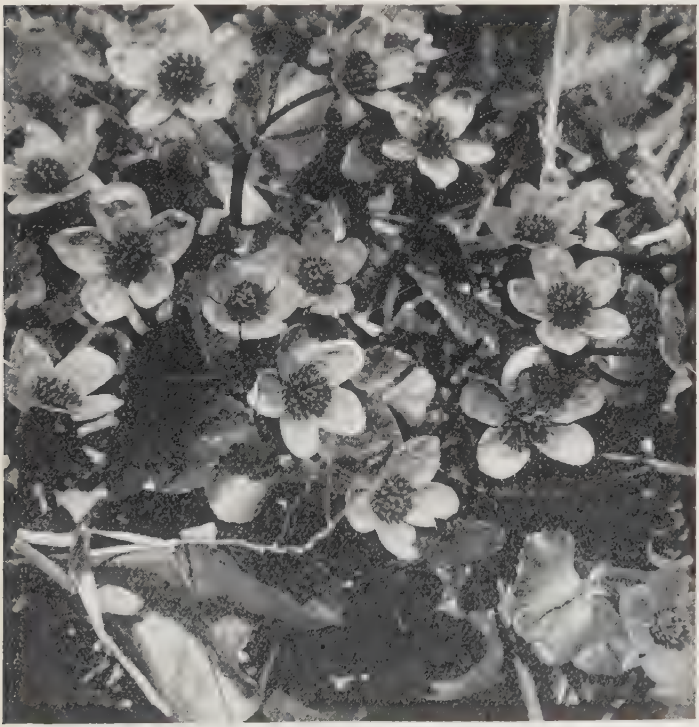


FIG. 14. COWSLIP (*Caltha palustris*)

1. **A. canadensis** L. 3-9 dm. tall, with scarlet flowers yellowish inside, 5 cm. long, nodding, the spurs turned inward.—Frequent in rich woods from Miller eastward among the dunes; westward and south in the Calumet District, rare, in woods and thickets. April, May. A handsome and showy plant, one of the most beautiful of our spring flowers.

4. **COPTIS** Salisb. Goldthread

Low smooth perennials, the leaves all basal, ternately divided; flowers small, white; sepals 5-7, petal-like, deciduous, the petals 5-7; stamens 15-25; pistils 3-7 on slender stalks; pods pointed with the style, 4-8-seeded, membranaceous, divergent.

1. **C. trifolia** (L.) Salisb. Rootstocks long, bright yellow, bitter-tasting; leaves evergreen, shining, the leaflets 3, obscurely again 3-lobed, sharply toothed; stem slender, 7-13 cm. tall, 1- or rarely 2-flowered.—Locally abundant on the edges of marshes, on low meadows, and in Nyssa woods on the outskirts of tamarack bogs, from Clarke to Mineral Springs and probably eastward throughout the range. May-July.

5. **HEPATICA** Hill. Hepatica. Liverleaf

Low-growing herbs with slender hairy stems and thickish heart-shaped 3-lobed leaves which persist through the winter. Sepals 6-12; flowers solitary; achenes several in a small loose head.

1. **H. triloba** Chaix. Leaves with three ovate obtuse or rounded lobes, those of the involucre also obtuse; sepals bluish, violet, white, or roseate; achenes ovate-oblong, pointed, hairy. (*H. Hepatica* Karst.)—In the richer woods among the high dunes from Miller to and beyond Michigan City. March, April.

Var. **acuta** Pursh. Leaves with 3 or 5 ovate and pointed lobes; lobes of the involucre also acute. (*H. acutiloba* DC.)—Range of the type.

6. **ANEMONELLA** Spach. Rue Anemone

Low perennials with the leaves all radical (but for the leafy involucre) and compound; involucre also compound, at the base of an umbel of flowers; sepals 5-10, white or pinkish; stigma terminal, broad, depressed; achenes 4-15, ovoid, terete, sessile, 8-10-ribbed.

1. **A. thalictroides** (L.) Spach. Stem 1-3 dm. tall, slender; leaves 2-3-ternately compound, the leaflets roundish and cordate at the base and 3-lobed at the end, on long stalks, similar to those on the 2-3-leaved involucre; sepals oval, 1.2 cm. long, tending to persist some weeks. (*Syndesmon* Hoffmg.)—In the richer low woods among dunes and occasional in thickets, in the Calumet District, as along the banks of Deep River. March-May.

7. **ANEMONE** L. Windflower

Perennial herbs with radical leaves, those of the stem 2-3 together, forming an involucre; peduncles 1-flowered, solitary or umbellate; sepals few or many, petal-like; achenes pointed or tailed, often woolly, flattened but not ribbed.

Involucre sessile.................................. *A. canadensis* 2.
Involucre petioled.
Divisions of the leaves ovate, broad.................... *A. virginiana* 4.
Divisions of the leaves wedge-shaped, narrow.
Plants 6-8 dm. tall, hairy........................... *A. cylindrica* 3.
Plants 0.6-2.2 dm. tall, nearly glabrous............... *A. quinquefolia* 1.

1. **A. quinquefolia** L. (*Wood Anemone.*) Stem simple from a whitish or brown rootstock; involucre of 3 trifoliate leaves, the divisions laciniately toothed, the lateral often 2-parted; sepals 4-7, ovate, white tinged with purple outside; stems slender, one-flowered; leaves radical; achenes few, nearly naked, ovate-oblong.—Occasional in rich woods and thickets. April, May.

2. **A. canadensis** L. Stems slender, slightly hairy, bearing a 3-leaved primary involucre, the peduncle branches each bearing a 2-leaved involucre at the middle, the branches again branched, their leaves broadly wedge-shaped, 3-cleft, cut and toothed; radical leaves 5-7-parted or cleft; sepals 5, obovate, 1.2-1.8 cm. long, white; fruiting head hemispherical, the achenes inflated, compressed, not woolly.—Banks of the Grand Calumet, and in oak woods on old beach ridges in the Calumet District. June-August.

3. **A. cylindrica** Gray. (*Thimbleweed.*) Tall slender plant, the involucral leaves thickish and veiny, two or three times as long as the peduncles, 3-divided, the lateral 2-parted, the middle 3-cleft; lobes cut and toothed at the apex; flowers 2-6 on long upright naked peduncles; sepals 5, woolly, obtuse, greenish white; achenes densely long-woolly, compressed.—A striking plant when in fruit, but inconspicuous in flower. One of the characteristic plants of the oak barrens in the Calumet District, not uncommon in oak dunes eastward. Flowers in June and July, fruit July-October.

4. **A. virginiana** L. (*Thimbleweed.*) Loosely pubescent or glabrous; the three involucral leaves 3-parted, the divisions pointed, cut-serrate, the lateral 2-parted, the middle 3-cleft; peduncles elongated, repeatedly branching; sepals 5, woolly outside, greenish and acute or sometimes whitish and obtuse; head of fruit ovoid or thick-cylindric, the achenes woolly.—Occasional in rich woods of the dunes and Calumet District. June-August.

8. CLEMATIS L. Clematis

Our species somewhat woody vines, with bending or clasping leaf-stalks by which they climb; flowers cymose-paniculate, rather small, the sexes on separate plants or the female flowers containing some sterile stamens; sepals petal-like, spreading, whitish.

1. **C. virginiana** L. (*Virgin's Bower.*) Stems long; leaves generally 3-foliate, dark green above, but silky beneath when young, in age more or less glabrate, heart-shaped at base, variously toothed. The persistent styles are in fruit contorted and plumose.—A handsome, fragrant, variable vine. In rich wet thickets near Wolf Lake, along a railroad embankment at Miller and low woods along Dune Creek. July, August.

9. **RANUNCULUS** L. Buttercup. Crowfoot

Annuals or more frequently perennials with alternate leaves and solitary or somewhat corymbed, yellow or occasionally white flowers; sepals 5 (or 3); petals 5 (or rarely more); fruit of small seed-like achenes arranged in dense heads.

Aquatics with submerged leaves finely divided.	
Petals with a pit or spot at the base, the blade at least white; achenes marginless, transversely wrinkled.	
Leaves sessile, rigid, not collapsing when withdrawn from the water	*R. longirostris* 1.
Leaves petioled, soft and collapsing when withdrawn from the water	*R. trichophyllus* 2.
Petals with a scale at the base, all yellow; achenes margined but not wrinkled	*R. delphinifolius* 3.
Mud or terrestrial plants but not true aquatics, the leaves variously divided or entire, but never finely dissected (a terrestrial state of No. 3 might be sought here).	
Style none; stigma essentially sessile.	
Petals about as long as the spreading calyx	*R. sceleratus* 4.
Petals shorter than the reflexed calyx	*R. abortivus* 5.
Stigma raised on a long style.	
Basal leaves lobed, not divided to the base; petals shorter than the sepals; beak of the fruit long and curved.	*R. recurvatus* 6.
Basal leaves usually divided to the base or composed of many distinct leaflets.	
Style long and attenuate, stigmatose at the tip, deciduous.	
Roots slender; petals broadly ovate	*R. septentrionalis* 9.
Roots fleshy-thickened; petals spatulate-oblong.	
Stem with closely appressed hairs	*R. fascicularis* 7.
Stem hirsute with spreading hairs, or smooth	*R. hispidus* 8.
Style short, recurved, stigmatose along the inner margin, persistent.	
Petals about 3 mm. long; head of fruit cylindrical	*R. pennsylvanicus* 10.
Petals 7-12 mm. long; heads of fruit globose	*R. acris* 11.

1. **R. longirostris** Godron. (*Water Crowfoot.*) Stems long; leaves all submerged, with broad, conspicuous stipules, the divisions and subdivisions short, spreading on one roundish plane; white flowers solitary on peduncles opposite the leaves. (*R. aquatilis* L. var. *divaricatus* Gray and var. *longirostris* Lawson; *R. divaricatus* of auths., not Schrank, *R. circinatus* of auths., not Sibth., *Batrachium divaricatum* Britton, not Wimm., *B. longirostre* F. Schultz.)—In deep waters of the Calumet River and Wolf Lake. Summer.

2. **R. trichophyllus** Chaix. (*Water Crowfoot.*) Stem long; leaves all submerged, the petiole narrowly dilated; similar to the preceding, but for differences in key. (*R. aquatilis* L. var. *capillaceus* DC., and var. *submersus* Godron; *R. divaricatus* Schrank; *Batrachium trichophyllum* F. Schultz.)—In deep water of the Calumet River and Wolf Lake. Summer.

3. **R. delphinifolius** Torr. (*Water Buttercup.*) Stems floating or submerged, the leaves repeatedly 3-forked into long filiform divisions, not collapsing when withdrawn from water; petals bright yellow, 5-8,

much larger than the sepals; carpels slightly roughened and margined toward the base with conspicuous tumid border, in a round head. (*R. multifidus* Pursh, not Forskal; *R. fluviatilis* Bigel., *R. lacustris* Beck & Tracy.)—Ponds, ditches and slow streams throughout. June, July. Var. *terrestris* (Gray) Farwell (*R. missouriensis* Greene) is an emersed state, rooting in the mud, with pubescent petioles and petals less than 8 mm. long, and stiffer, less finely cut leaves of roundish outline. It occurs in mud or water of the Grand Calumet around Clarke and Hammond.

4. **R. sceleratus** L. (*Cursed Buttercup.*) Glabrous; root leaves and lower stem leaves 3-parted, lobes again lobed or toothed; upper leaves subsessile, lobes nearly entire, narrow; small greenish yellow petals scarcely exceeding the sepals; mature carpels in an ovoid cylindric head, numerous, scarcely mucronulate.—Stem thick and hollow; juice acrid and blistering; leaves thickish. In ditches, bogs, and swampy meadows, Mineral Springs to Michigan City and its environs. June-August.

5. **R. abortivus** L. Slightly succulent; pubescence sparse, deciduous; first root leaves kidney-form or round-heart-shaped with wide shallow sinus, barely crenate, the succeeding often 3-lobed or 3-parted; stem leaves 3-5-parted or divided, subsessile, mostly toothed, divisions narrow wedge-form; petals pale yellow, shorter than the reflexed calyx; carpels minute, mucronulate, in an ovoid or cylindric head.—Edges of sloughs and rivers and in low woods, throughout. April-June.

6. **R. recurvatus** Poir. 3-6 dm. tall, hirsute; leaves of the root and stem similar, long-petioled, deeply 3-cleft, large; lobes 2-3-cleft, toothed near apex, broadly wedge-shaped; petals pale yellow, shorter than the reflexed calyx; achenes in globular or ovoid heads, compressed, with an evident firm margin; beak long, recurved.—In damp woods, not in water, among rich thickets behind the high dunes. May, June.

7. **R. fascicularis** Muhl. 1-2.5 dm. tall; root leaves with terminal division remote from the sessile lateral ones, and 3-5-divided or -parted; petals bright yellow, twice as long as the spreading calyx; carpels scarcely margined, beak slender, curved; fruiting head globular or ovoid.—Dry or moist ground, generally under shade, occasional in the Calumet District, becoming more common around Michigan City. April-June.

8. **R. hispidus** Michx. Stem 1-4 dm. tall, flexible but not creeping; root leaves 3-lobed or -divided; petals bright yellow.—In moist soil.

9. **R. septentrionalis** Poir. 3-8 dm. tall, usually villous; lower petioles very long; leaves 3-divided, broadly wedge-shaped or ovate, 3-cleft and cut; petals bright yellow, broadly obovate, much larger than the spreading calyx; mature carpels strongly margined, pointed by a stout straightish beak, the fruiting heads globular or ovoid.—In meadows between dunes around Michigan City, perhaps elsewhere. May-August. In wet ground some stems form runners.

10. **R. pennsylvanicus** L. f. Stout, bristly-hirsute, leafy to the top, 4-6 dm. tall; leaves all ternately divided or compound; sepals reflexed; petals bright yellow but small; carpels obscurely margined, in a short

cylindric head; style short, recurved.—Banks of the Grand Calumet, and edges of sloughs, Dune Park and Furnessville. June-August.

11. **R. acris** L. Stem 6-9 dm. tall, hairy; leaves 3-divided, all the divisions 3-cleft or -parted and sessile, with segments cut into narrow crowded lobes; petals bright yellow, much longer than the spreading calyx; stigma and achene similar to the preceding.—Adv. from Eu. Around towns of the Calumet District. June-August.

10. THALICTRUM L. Meadow Rue

Perennials with 2-3-ternately compound leaves with stalked divisions, the petioles dilated at the base; flowers in panicles or corymbs, frequently the sexes on separate plants, or a few perfect flowers found on a plant; sepals 4-5, petal-like and greenish, usually soon falling; achenes 4-15-grooved or ribbed, in our species sessile or subsessile, thin-walled, the ribs often connected by transverse reticulations.

Filaments very slender, soon drooping.
  Petioles of the stem-leaves well developed............... *T. dioicum* 1.
  Petioles of the stem-leaves short or none................ *T. revolutum* 2.
Filaments distinctly club-shaped, ascending or spreading till after flowering.................................. *T. canadense* 3.

1. **T. dioicum** L. 3-6 dm. tall, pale or glaucous and smooth, the 2 or 3 leaves all with petioles; leaflets drooping, 3-7-lobed and nearly round, thin, pale green; unisexual, the sepals white, greenish or purplish.—A dainty little plant of shaded rich dunes, Miller to Tremont. April, May.

2. **T. revolutum** DC. 6-12 dm. tall; usually purplish; leaflets thickish, finely glandular-puberulent, veiny, pale; plants unisexual; sepals and filaments purplish or white. (*T. purpurascens* var. *ceriferum* Austin.)—Frequent in low meadows and along roadside ditches throughout. Summer.

3. **T. canadense** Mill. Stem 0.5-2.5 m. tall; leaflets rather firm but not waxy-glandular, roundish to oblong, generally with mucronate tips, sometimes puberulent below; panicle several times compound; flower white, the female with some stamens; filaments white. (*T. polygamum* of auths., not Muhl.)—A handsome plant less frequent than the preceding, in rich meadows and thickets locally throughout. Summer.

MAGNOLIA FAMILY (Magnoliaceae)

Trees or shrubs with alternate, entire or rarely lobed leaves, large solitary flowers and bitter aromatic bark; sepals and petals in threes; stamens many; carpels many, separate or coherent, borne on the surface of the elongated receptacle, ripening into an aggregate fruit composed of 1- or 2-seeded follicles or achenes.

1. LIRIODENDRON L. Tulip Tree

Tree with truncate or broadly emarginate 4-6-lobed leaves; flowers large, solitary; sepals 3, reflexed, petal-like; petals 6; carpels samara-like, spiked on the receptacle, 1-2-seeded.

1. **L. Tulipifera** L. Tree 20-60 m. tall, with straight trunk and smooth bark or shallowly furrowed in age, often forked from the base; branches arching; leaves glabrous, notched at the apex, rounded or cordate at base, with 2 apical and 2-4 basal lobes, the sinuses rounded; flowers greenish-yellow, orange within, fragrant; cone of fruit dry, oblong, acute.—A fine forest tree with white sap-wood and yellow heart-wood. On dune crests and in low woods throughout the high dune country, but common only from Michigan City eastward. Occurs sporadically in the Calumet District west of Hammond. May, June.

CUSTARD-APPLE FAMILY (Annonaceae)

Trees or shrubs with aromatic alternate entire leaves without stipules; sepals 3 (2); petals about 6, arranged in 2 series; stamens numerous; carpels numerous and separate or cohering as a mass and ripening into a single compound fleshy fruit containing large seeds.

1. ASIMINA Adans. Pawpaw

Small trees or shrubs with bad-smelling leaves and lateral or axillary nodding flowers, the outer series of petals larger than the inner; stamens and carpels 3-15; receptacle subglobose; seeds large, flat, imbedded in the fleshy arils.

1. **A. triloba** (L.) Dunal. Generally a mere shrub, but sometimes as much as 15 m. tall; shoots and young leaves dark-pubescent, at maturity glabrous; leaves obovate, acute, 15-30 cm. long; flowers axillary, appearing with the leaves, 2.5-4 cm. across, the petals fleshy, dark red or purplish, the outer ones recurved; fruit 8-20 cm. long and 3-6 cm. thick, at first green, turning dark brown, roundish-oblate. (*Porcelia* Pers.)—Rare in the low marshy woods from Mineral Springs to Tamarack Sta., except along Dune Creek, but becoming common in rich woods east of Michigan City. April, May. The flowers have the odor of over-ripe strawberries; the fruit which is mature in late autumn is custardy and delicious when fully ripe.

MOONSEED FAMILY (Menispermaceae)

Our species woody vines with alternate, palmately veined leaves and panicles of small flowers, the sexes on separate plants; sepals 4-12, often in 2 rows, as are the 6-8 petals; stamens 6-24; carpels 3-many, separate, with recurved styles; fruit a drupe.

1. MENISPERMUM L. Moonseed

Sepals 4-8; petals 6-8; stamens 12-24 in the male flowers; the female flowers often have 6 sterile filaments accompanying the 2-4 pistils; drupe globular, flattened on the back; seed spiral, its sides and back crested.

1. **M. canadense** L. High-climbing; leaves broadly ovate, entire, or 3-7-lobed, pale beneath, dark green and shining above; flowers white; drupe black, with a bloom, in grape-like clusters and about the size of our wild grapes.—Infrequent in rich dune woods from Tremont to the Michigan line. June, July. Fruit in September.

LAUREL FAMILY (Lauraceae)

Aromatic trees and shrubs with alternate, thick, punctate leaves without stipules; flowers small, the sexes on separate plants in ours, fragrant; calyx 4-6-parted, in 2 series; corolla none; stamens in 3 or 4 series, inserted on the calyx, some commonly sterile; ovary free from the calyx, style filiform or short, stigma discoid or capitate; fruit a 1-seeded berry or drupe.

Flowers in peduncled corymbed racemes; anthers 4-celled; female flowers containing 6 rudimentary stamens; fruit on a thickened fleshy pedicel..................	*Sassafras* 1.
Flowers in nearly sessile umbel-like clusters; anthers 2-celled; female flowers with 15-18 rudimentary stamens; pedicel of fruit not thickened and fleshy....................	*Benzoin* 2.

1. SASSAFRAS Nees & Eberm. Sassafras

Trees or shrubs with 1-3-lobed deciduous leaves and yellow flowers in involucrate umbelled racemes unfolding with or before the leaves; calyx 6-parted, that of the female flowers persistent; stamens 9, in three series; 6 staminodia in the female flowers; fruit an oblong-globose blue drupe.

1. **S. officinale** Nees & Eberm. Tree or shrub with rough-barked trunk and smooth light green flexuous twigs and young bark, the inner bark mucilaginous; leaves oval and entire or with rounded terminal lobes, or with one lobe and mitten-shaped, petioled, pinnately veined, light green, turning orange in autumn, mucilaginous; fruiting pedicels red, much thickened below the calyx. (*S. Sassafras* Karst., *S. variifolium* Kuntze.)—Perhaps the commonest woody plant of the dunes, with us rarely more than a shrub; the blue fruits and red pedicels are very ornamental; root used by druggists for its aromatic oil. May.

2. BENZOIN Fabricius. Spice Bush

Leaves opening from a scaly bud, appearing after the flowers; male flowers with 9 stamens in 3 rows, the inner filaments gland-bearing; ovary globular; drupe obovoid.

1. **B. aestivale** (L.) Nees. (*Benjamin Bush.*) Shrub 2-5 m. tall, with smooth yellowish twigs and spicy-smelling bark; leaves oblong-obovate, never lobed, pale beneath; flowers honey-yellow, fragrant; fruit scarlet. (*B. Benzoin* Coulter, *Lindera Benzoin* Blume.)—In rich dune woods. April, May.

MAY-APPLE FAMILY (Podophyllaceae)

Our species herbs with alternate or basal leaves and solitary or racemed, generally terminal flowers; sepals and petals generally overlapping in 2 or more series; stamens opposite the petals and of the same number or more; flowers perfect; pistil one; style short; fruit a berry or capsule or resembling a drupe.

Stamens 12-18	*Podophyllum* 1.
Stamens 6	*Caulophyllum* 2.

1. PODOPHYLLUM L. May-apple

Rootstock horizontal; leaves large, peltate, palmately lobed; flowers solitary, white; sepals 6, petal-like, early deciduous; petals 9-16, longer than the sepals; stamens as many as, or more than, the petals; pistil thick, angular, ripening into a large fleshy berry.

1. **P. peltatum** L. (*Mandrake.*) Stem 3-5 dm. tall, with centrally peltate, 5-7-lobed, long-petioled leaves, the upper surface dark green and shining, the lower paler; flowering stems appearing from different rootstocks, bearing 1-3 similar leaves or sometimes leafless; petals gleaming white or rarely pink, the flowers nodding below the leaves; fruit ovoid, yellowish, 5 cm. long.—Occasional in rich woods, especially along Dune Creek. May, June. The rootstocks are emetic; the fruit is edible, having a lemon flavor.

2. CAULOPHYLLUM Michx. Blue Cohosh

Perennial, glabrous, the rootstock matted and knotty; stem naked, forking into the three stalks of a large triternately compound leaf, terminating in a panicle or small raceme of yellowish green, inconspicuous flowers; sepals 6, with 3 or 4 bractlets at base; petals thick, gland-like and somewhat hooded or kidney-shaped, with short claws, much smaller than the sepals and situated at the base of them; ovary bursting from the pressure of the 2 enlarging seeds and withering away; seeds appearing like spherical drupes with a fleshy, ultimately blue, outer coat, hanging on their seed-stalks.

1. **C. thalictroides** (L.) Michx. (*Papoose Root.*) Stems 3-7.5 dm. tall; whole plant glaucous when young; leaflets 2-3-lobed, wedge-obovate; small biternate leaf often found at base of panicle; flowers appearing while leaf is small; seeds as large as peas. (*Leontice* L.)—Rare, except in tamarack bogs and in low rich woods along Dune Creek. May.

DUTCHMAN'S PIPE FAMILY (Aristolochiaceae)

Our species low herbs with perfect flowers; calyx with 3 lobes, coherent to the 6-celled ovary; stamens 5-12, more or less united with the style; anthers adnate; fruit a 6-celled capsule or berry; leaves heart-shaped, petioled, entire.

1. **ASARUM** L. Wild Ginger

Stemless perennial herbs with creeping rootstocks bearing 2 or 3 scales, then one or two kidney-shaped leaves on long petioles, and a short-peduncled flower in the lower axil, close to the ground; calyx regular; petals none, or 3 and then rudimentary; stamens 12 with distinct filaments, these continued beyond the anthers into a point; capsule fleshy, globular, bursting irregularly or along the valves; seeds large and thick.

1. A. **canadense** L. var. **acuminatum** Ashe. (*Monkey-jug.*) Softly pubescent, the leaves thin, only 2 in number, more or less pointed; calyx bell-shaped, brown-purple inside, thickish, the segments long and slender; style barely 6-lobed at the summit, with 6 thick radiating stigmas.—An unusual plant, the flowers blooming on the ground, often under leaves. Rootstocks pungent-aromatic. Early spring. Rare, in rich dune woods, Port Chester.

POPPY FAMILY (Papaveraceae)

Herbs with colored or milky juice and regular flowers; sepals in our species 2, falling off as the flower expands; petals 4-12, spreading, soon falling; stamens distinct, numerous; fruit a dry 1-celled pod; seeds numerous. The prickly-poppy, *Argemone intermedia*, was found one year as a railroad waif at Miller, acc. to Pepoon, but is not now found.

Petals 8-12, not crumpled in the bud; pod smooth..........	*Sanguinaria* 1.
Petals 4, crumpled in bud; pod bristly......................	*Stylophorum* 2.

1. **SANGUINARIA** L. Bloodroot

Perennial with thick prostrate rootstocks and a radical palmate-lobed leaf; scape 1-flowered; stamens about 24; style very short, 2-grooved; pod ellipsoid, turgid; seeds crested.

1. S. **canadensis** L. Low growing, smooth, glaucous, the veiny leaves roundish-heart-shaped, palmately 5-9-lobed; flowers white, the slender petals narrowly oblong, erect.—A fragile and pretty flower beside which arise the furled early leaves; at flowering the leaves uncurl; after flowering they greatly enlarge and thicken; late in the summer they disappear; the flowers open in the morning and partially close at night. Rare in our area in rich dune woods. Early spring.

2. **STYLOPHORUM** Nutt. Celandine Poppy

Perennials with stems naked below and oppositely 2-leaved or sometimes 1-3-leaved; flower buds and pods nodding; sepals hairy; style columnar; stigma 2-4-lobed.

1. S. **diphyllum** (Michx.) Nutt. Rootstocks stout, containing yellow juice; stems low, glaucous; leaves pinnately parted or divided, both basal and on the stem, the radical often with a pair of distinct

leaflets; flower solitary or a few in an umbel; petals deep yellow, broad; stigmas 3 or 4; pods ovoid.—A beautiful spring flower, rare, chiefly on limestone and prairies, occasional as far north as Pine and Miller. A few plants found at Mineral Springs.

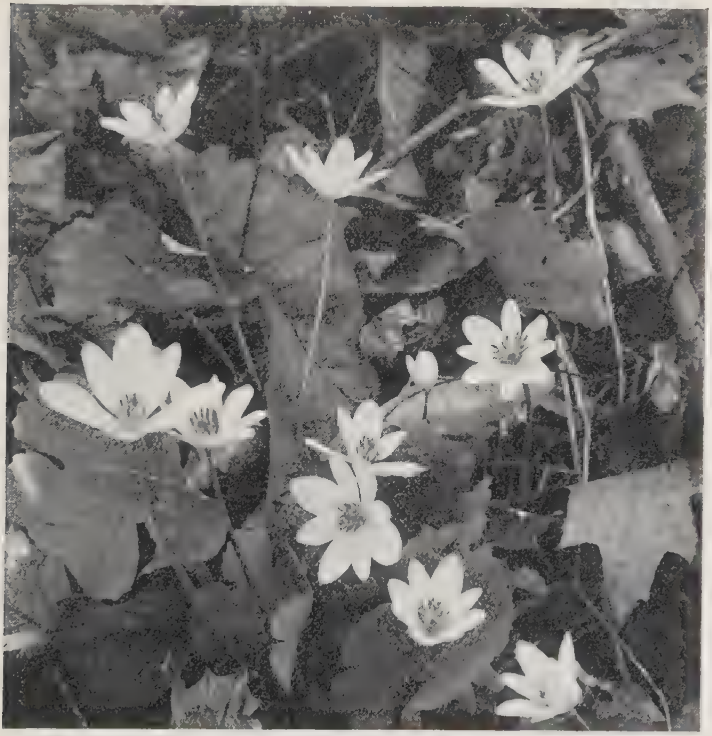


FIG. 15. BLOODROOT (*Sanguinaria canadensis*)

CORYDALIS FAMILY (Corydalaceae)

Delicate smooth herbs with watery juice, compound, dissected leaves and irregular flowers with 4 somewhat united petals; 6 stamens in 2 sets of three; 2 small scale-like sepals; pods and seeds like those of the poppy family.

Corolla 2-spurred, the outer 2 petals alike.................	*Dicentra* 1.
Corolla with only one petal spurred at base...............	*Corydalis* 2.

1. **DICENTRA** Bernh. Dutchman's Breeches

Low stemless perennials with thrice compound, dissected leaves; flowers nodding in racemes; petals cohering into a heart-shaped or 2-spurred corolla; filaments slightly united into 2 groups; pods 10-20-seeded.

1. **D. canadensis** (Goldie) Walp. (*Squirrel Corn.*) Plants with grain-like tubers beneath ground; leaves slender-petioled, delicate, all basal; racemes simple, few-flowered; corolla with very short rounded spurs, greenish white and purplish; crest of the inner petals projecting conspicuously. (*Bicuculla* Millsp., *Capnorchis* Kuntze.)—A delicate little plant of rich cool dune woods, rare. May. The tubers resemble grains of corn; flowers slightly fragrant.

2. **CORYDALIS** Medic. Corydalis

Biennial leafy-stemmed glaucous plants with delicate alternate leaves without stipules; flowers in racemes; corolla 1-spurred; pod many-seeded, with persistent styles.

1. **C. sempervirens** (L.) Pers. Plants 1-6 dm. tall; stem strict; racemes panicled; flowers pink with yellow tips, or purplish; spurs very short and rounded; pods slender, elongated, erect. (*Capnoides* Borck.)—A pretty little plant with blue-green leaves and showy flowers, rare in sterile or sandy woods at Miller, rather abundant around Gibson. Summer.

MUSTARD FAMILY (Cruciferae)

Herbs, in our species, with pungent watery juice and cruciform or cross-shaped regular flowers, the sepals and petals 4, the stamens 6 (rarely 4 or 2), two of them inserted lower down and shorter; fruit a pod, usually 2-celled by a thin partition stretched between the seed rows from which the valves of the ripe pod split. The pod may be much longer than broad (when it is called a silique) or if short and broad then a silicle; sometimes it is non-splitting and nut-like, or it may separate in cross-section into 1-seeded joints.

KEY TO FLOWERS AND LEAVES

- Upper stem leaves sessile and clasping at the base with conspicuous auricles, or perfoliate, entire or toothed, the lower leaves narrow.
  - Leaves perfoliate.................................... *Conringia* 8.
  - Leaves not perfoliate.
    - Lower leaves pinnately lobed.
      - Flowers yellow.................................... *Brassica* 10.
      - Flowers white.................................... *Capsella* 1.
    - Lower leaves merely toothed.
      - Petals yellow.
        - Plant glabrous .... *Camelina* 3.
        - Plant hirsute-pubescent. .... *Neslia* 13.
      - Petals white or whitish or none.

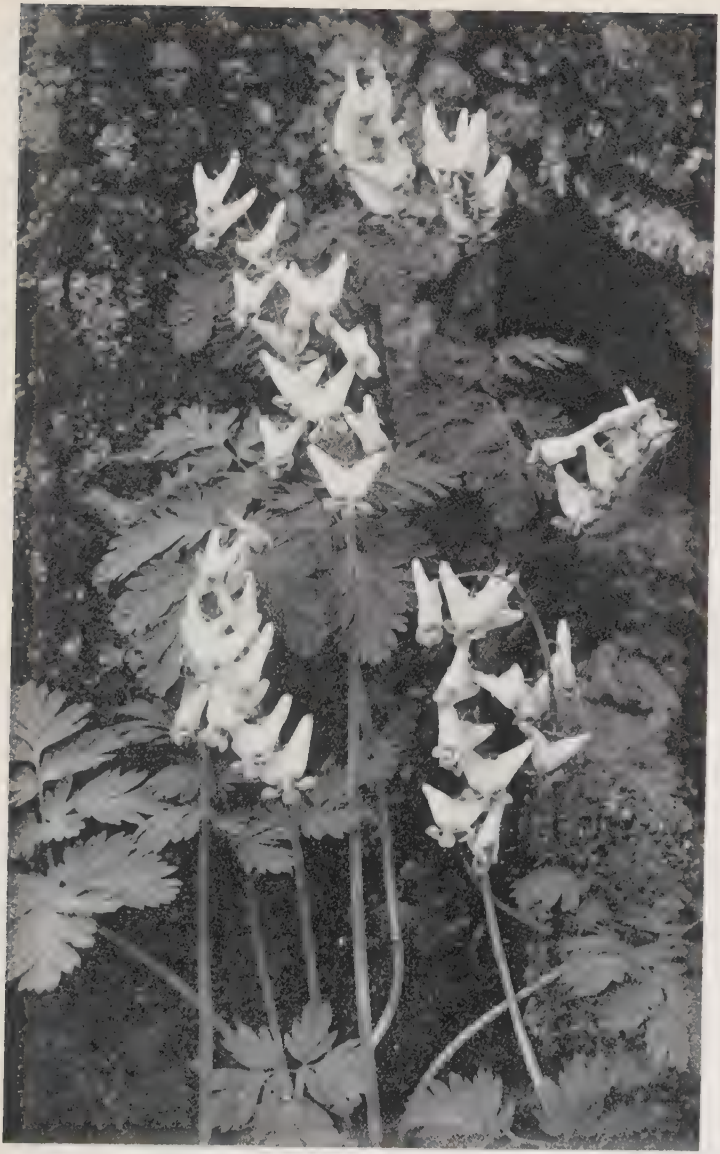


FIG. 16. SQUIRREL CORN (*Dicentra canadensis*)

Lower leaves pinnately cleft into small leaflets, with one large terminal one.................... *Lepidium* 2.

Lower leaves incised but not pinnately cleft....... *Arabis* 17.

Upper leaves petioled or sessile but not clasping.

Leaves entire or toothed, not pinnately lobed or divided.

Plants with naked stem, the leaves in a basal rosette; petals white.................................. *Draba* 15.

Plants with leafy stems.

Very fleshy beach plants with white or purple flowers. *Cakile* 12.

Plants not very fleshy.

Leaves glabrous; petals white................... *Cardamine* 16

Leaves, at least the lower, hairy.

Flowers yellow............................. *Erysimum* 9.

Flowers white.

Leaves lanceolate or broader, often toothed... *Arabis* 17.

Leaves mostly linear or linear-spatulate, entire. *Alyssum* 14.

At least some of the leaves pinnately lobed or divided.

Upper stem leaves linear, mostly entire; petals white or none.

Petals none, or less than 2 mm. long................ *Lepidium* 2.

Petals 5-7 mm. long............................. *Arabis* 17.

Upper stem leaves broader, toothed or pinnately divided.

Petals white or rose or purple.

Upper leaves simple; petals usually purple........ *Raphanus* 11.

Upper leaves pinnately divided; petals white or faintly purple or rosy.

Stem leaves 3-7-palmately compound, 3 in a whorl................................ *Dentaria* 18.

Stem leaves variously lobed or divided, minutely but not palmately compound, not in whorls of 3.

Leaflets of the upper leaves more than twice as long as broad..................... *Cardamine* 16.

Leaflets of the upper leaves less than twice as long as broad....................... *Roripa* 4.

Petals yellow.

Petals 5 mm. long or less.

Plants very hairy........................... *Sophia* 6.

Plants practically glabrous.

Terminal lobe of the leaf much longer than broad............................... *Roripa* 4.

Terminal lobe of the leaf often as broad as long.............................. *Barbarea* 7.

Petals 8-15 mm. long.

Upper leaves pinnately divided into linear lobes.. *Sisymbrium* 5.

Upper leaves simple or with very broad lobes or merely toothed, but not pinnately divided into linear lobes.

Petals very veiny.......................... *Raphanus* 11.

Petals not markedly veiny................. *Brassica* 10.

KEY TO FRUITS

Pods flattened or compressed contrary to the narrow partition between the seeds.

Pods obcordate, wingless............................ *Capsella* 1.

  - Pods orbicular to elliptic or obovate, sometimes winged or margined. . . . . *Lepidium* 2.
- Pods compressed or flattened parallel to the partition or else roundish or prismatic and not compressed.
  - Pods roundish or prismatic.
    - Pods opening along a suture.
      - Length of pods less than twice the width.
        - Seeds flat; plants pubescent with mostly branched hairs. . . . . *Camelina* 3.
        - Seeds turgid; plants glabrous or pubescent with simple hairs. . . . . *Roripa* 4.
      - Length of pod over twice the width.
        - Pods merely tipped by the short style, or style wanting; pod not beaked.
          - Pods roundish.
            - Valves of the pod nerveless. . . . . *Roripa* 4.
            - Valves of the pod strongly nerved.
              - Seeds in 1 row in each cell. . . . . *Sisymbrium* 5.
              - Seeds in 2 rows in each cell. . . . . *Sophia* 6.
          - Pods 4-sided or -angled.
            - Seeds flat. . . . . *Barbarea* 7.
            - Seeds plump.
              - Leaves perfoliate. . . . . *Conringia* 8.
              - Leaves not perfoliate. . . . . *Erysimum* 9.
        - Pods markedly beaked. . . . . *Brassica* 10.
    - Pods without an opening suture.
      - Pods elongated.
        - Pods merely constricted. . . . . *Raphanus* 11.
        - Pods transversely jointed and separating into 2 parts. . . . . *Cakile* 12.
      - Pods globular. . . . . *Neslia* 13.
  - Pods flattened or compressed parallel to the broad partition between the seeds.
    - Pods suborbicular or oval. . . . . *Alyssum* 14.
    - Pods oblong to narrowly linear.
      - Seeds in 2 rows in each cavity. . . . . *Draba* 15.
      - Seeds in 1 row in each cavity.
        - Plants with at least some of the pubescence branched. *Arabis* 17.
        - Plants glabrous or pubescent with simple hairs.
          - Leaves 3-7-palmately compound, the stem leaves in whorls of 3. . . . . *Dentaria* 18.
          - Leaves simple, or variously lobed, or pinnate; stem leaves not in whorls of 3. . . . . *Cardamine* 16.

1. CAPSELLA Medic. Shepherd's Purse

Annuals with small white flowers and wingless obcordate-triangular pods which open by 2 valves and are flattened contrary to the narrow partition; seeds numerous. Some or all of the pubescence branched.

1. **C. Bursa-pastoris** (L.) Medic. Slender plant with arrow-shaped sessile stem leaves. (*Bursa pastoris* Weber.)—A common weed variable as to foliage and outline of pod; lawns, waste ground, around roads and cities. Nat. from Eu. Spring-autumn.

2. LEPIDIUM L. Peppergrass

Annuals; pubescence simple or none; upper leaves entire, lower and middle incised or pinnatifid; petals small, white or none; stamens 2; pods roundish, flat, slightly notched at top, flattened contrary to the narrow partition between the seeds which are solitary in each cell.

Stem leaves sagittate-clasping	*L. campestre* 3.
Stem leaves not clasping.	
Pod wingless	*L. virginicum* 1.
Pods minutely wing-margined	*L. apetalum* 2.

1. **L. virginicum** L. Low-growing; leaves oblong, coarsely toothed. —A common weed in waste places and along roadsides. June-September.

2. **L. apetalum** Willd. Similar; leaves lanceolate.—Along railroad tracks, roads, etc. Nat. from Great Plains.

3. **L. campestre** (L.) R. Br. Leaves arrow-shaped, somewhat toothed, with a partly clasping base.—Nat. from Eu.

3. CAMELINA Crantz. False Flax

Our species annual with yellow flowers and some or all of the hairs branched; pods short, scarcely longer than broad, turgid, obovoid or pear-shaped, pointed, margined, opening by 2 valves; seeds oblong, numerous.

1. **C. microcarpa** Andrz. Slender; leaves arrow-shaped and lanceolate; pods small, on short pedicels.—A weed of newly planted fields. Nat. from Eu. Early summer.

4. RORIPA Scop. Cress

Aquatic or marsh plants with small white or yellow flowers and mostly pinnate or pinnatifid leaves; pod short, globular or slender, roundish in cross-section, with strongly convex nerveless valves; seeds in 2 irregular rows in each cell, small, numerous, marginless, plump.

Petals white, twice the length of the calyx; pods linear; leaves pinnate	*R. Nasturtium aquaticum* 1.
Petals yellow or greenish, seldom much exceeding the calyx; pods linear, short-cylindric or ovoid or globular; leaves mostly pinnatifid.	
Perennial from creeping or subterranean shoots; flowers rather large	*R. sylvestris* 2.
Annual or biennial with simple fibrous roots; flowers small, greenish; leaves somewhat lyrate.	
Stem smooth; pods cylindric-ellipsoid	*R. palustris* 3.
Stem hispid; pods globular	*R. hispida* 4.

1. **R. Nasturtium aquaticum** (L.) Schinz & Thell. (*Water Cress.*) Perennial with stem rooting and creeping; leaflets 3-11, roundish, almost entire; pods ascending on widely spreading pedicels, 1.2-1.6 cm. long. (*Sisymbrium* L., *Roripa Nasturtium* Rusby; *Nasturtium aquaticum* R. Br., *Radicula* Britten & Rendle.)—Cultivated in streams and escaped around Michigan City, Trail Creek. Also on Tamarack bog at Mineral Springs. Intr. from Eu. Spring.

2. **R. sylvestris** (L.) Bess. (*Yellow Cress.*) Stems ascending; leaves pinnately parted with cut or toothed narrow divisions; pods 6-12 mm. long on slender pedicels, linear or narrow. (*Sisymbrium* L., *Nasturtium* R. Br., *Radicula* Druce; *Radicula pinnata* Moench.)—Occasional in wet meadows. Nat. from Eu. Summer.

3. **R. palustris** (L.) Bess. (*Marsh Cress.*) Erect, 2-8 dm. tall, smooth; leaves laciniate or pinnately parted with cut-toothed lobes; pods short-cylindric, ovoid, not as long as the pedicels. (*Nasturtium* DC., *Radicula* Moench, *N. terrestre* R. Br., *Sisymbrium amphibium* var. *palustre* L.)—Common in wet places and shallow water. June-September.

4. **R. hispida** (Desv.) Rydb. Similar to preceding (see key). (*Radicula* Britton; *Nasturtium* DC.)—Common with the preceding.

5. SISYMBRIUM L. Hedge Mustard

Annuals or biennials with small yellow flowers, the pods roundish, flattish, or 4-6-sided, the valves 1-3-nerved; seeds oblong, marginless, 1 row in each cell; stigma 2-lobed; pubescence of simple hairs or none.

Pods awl-shaped, 1-1.5 cm. long, thicker than the ascending-appressed slender pedicels........................	*S. officinale* 1.
Pods linear-cylindric, longer, slender and not thicker than the widely spreading pedicels........................	*S. altissimum* 2.

1. **S. officinale** (L.) Scop. (*Common Hedge Mustard.*) Stem as much as one meter tall, with pinnatifid leaves, at least the lower, the terminal segments the largest and broadest; flowers small; pods pubescent, close-pressed to the stem which generally has a few branches at right angles to the main stem. (*Erysimum* L.) In the common var. *leiocarpum* DC., the pods are glabrous.—A common coarse weed of vacant lots, railroad tracks, etc., abundant throughout, especially the Calumet District. Spring, summer. Adv. from Eu.

2. **S. altissimum** L. (*Tumble Mustard.*) Tall plant with deeply pinnatifid leaves, the terminal as well as the other segments long and narrow; flowers pale yellow; pods very long and slender, rigid, widely spreading. (*Norta* Britton.)—Becoming common around cities of the Calumet District and even in the dunes; a conspicuous weed adv. from Eu. Summer.

6. SOPHIA Adans. Tansy Mustard

Similar to *Sisymbrium*, but the stigma simple; pubescence forked or stellate; seeds in 2 rows in each cavity.

1. **S. pinnata** (Walt.) Britton. Stem 2-6 dm. tall; leaves pinnatifid to tripinnatifid, tansy-like and delicate, canescent with short soft hairs; flowers very small; racemes long; pods oblong-club-shaped, shorter than the horizontal spreading pedicels. (*Sisymbrium canescens* Nutt.)—In dry soil, frequent around Miller and occasional elsewhere. Spring and summer.

7. BARBAREA R. Br. Winter Cress

Coarse biennials with racemes of yellow flowers and linear, roundish or slightly 4-sided pods which are 2-celled, and dehiscent by 1-nerved valves, and flattened parallel to a broad partition; seeds marginless, in 1 row in each cell.

Flowers bright yellow, racemose; pods spreading; lower leaves lyrate, the terminal division round, the lateral if present 1-4 pairs..................................	*B. vulgaris* 1.
Flowers pale yellow, corymbosely aggregated at the end of the raceme; pods appressed.........................	*B. stricta* 2.

1. **B. vulgaris** R. Br. (*Yellow Rocket.*) Stems stout, tufted; lower leaves lyrate, the terminal division round, large, the lateral of 1-4 pairs, or sometimes none; upper leaves pinnatifid at base or cut-toothed. (*Erysimum Barbarea* L., *B. Barbarea* MacM., *Campe Barbarea* Wight.)—A somewhat succulent, edible weed, nat. from Eu., frequent in ditches and low ground around cities, especially the Calumet District. Spring.

2. **B. stricta** Andrz. Similar to the preceding (see key). (*Campe* Wight; *B. vulgaris* var. Gray.)—Somewhat succulent weed, capable of being used for greens. Railroad ballast, Calumet District. Nat. from prairies. Spring.

8. CONRINGIA Adans. Hare's-ear Mustard

Glabrous annuals with sessile, entire, elliptic, stem-clasping leaves; flowers yellow or white; pods long, linear, somewhat rigid, 4-sided; seeds plump.

1. **C. orientalis** (L.) Dumort. Slightly succulent and glaucous; flowers often nodding; leaves perfoliate. (*Brassica* L., *Erysimum* R. Br.)—An occasional waif along railroad tracks. Adv. from Eu. Spring.

9. ERYSIMUM L. Treacle Mustard

Biennials with appressed pubescence, the hairs 2-3-parted; flowers yellow, racemose; pods linear, 4-sided, the valves with a strong nerve; seeds in 1 row in each cell, marginless, oblong; stigma broadly lobed.

1. **E. cheiranthoides** L. (*Wormseed Mustard.*) Slender, branching, minutely roughened; leaves almost entire, slender; flowers small, racemose; pods short, obtusely angled, small, ascending on spreading pedicels. (*Cheirinia* Link.)—A native plant appearing as if adventive by its weed-like habits. Dry open ground of the Calumet District. Spring, summer.

10. BRASSICA L. Mustard. Turnip

Annuals or biennials, the lower leaves lyrate, incised, or pinnatifid; flowers chiefly racemose, yellow; pods 4-sided or nearly roundish, slender or thickish, tipped with a stout, often 1-seeded beak; seeds in 1 row, globose.

Beside the following, *B. Rapa* L. (turnip) and *B. oleracea* L. (cabbage), both of which are cultivated in our area, may possibly be sporadically naturalized.

Leaves clasping	*B. campestris* 4.
Leaves not clasping.	
Beak sword-shaped, one-half the total length of the pod, containing 1 seed	*B. alba* 1.
Beak conical, shorter, seedless.	
Pedicels slender, spreading; plant glabrous and glaucous.	*B. juncea* 2.
Pedicels erect; plant hirsute	*B. nigra* 3.

1. **B. alba** (L.) Boiss. (*White Mustard.*) Leaves all pinnatifid; seeds pale; pods bristly on ascending pedicels. (*Sinapis* L.)—Frequent, waste ground. Nat. from Eu. Summer.

2. **B. juncea** (L.) Cosson. (*Indian Mustard.*) Lower leaves lyrate; upper subentire. (*Sinapis* L.)—Rare along railroad tracks. Nat. from Asia. Summer.

3. **B. nigra** (L.) Koch. (*Black Mustard.*) Leaves petioled, the lowest with one large terminal lobe and a few small lateral ones; pods short. (*Sinapis* L.)—A common pest in fields, adv. from Eu. Summer, autumn.

4. **B. campestris** L. (*Rutabaga.*) Stem glaucous, hispidulous; pods slender, upwardly tapering, longitudinally grooved, tipped by a short conic beak.—A bad European weed in old fields of the Calumet District. Summer.

11. RAPHANUS L. Radish

Annuals or biennials with thick tap roots and elongated racemes of white, yellow, or purple flowers; pods spongy and somewhat constricted between the spherical seeds, appearing somewhat necklace-like, with no true partition between the seeds; style long.

Pods necklace-form, with a slender beak	*R. Raphanistrum* 1.
Pods thick, with a conical beak	*R. sativus* 2.

1. **R. Raphanistrum** L. (*Charlock.*) Annual from a slender root; flowers purple-veined and yellow, fading white or purple; pods slender, nearly cylindric when fresh, constricting between the seeds when dry, longitudinally grooved, tipped by a short conic beak.—A bad European weed in old fields of the Calumet District. Summer.

2. **R. sativus** L. (*Radish.*) Similar but root deep and spindle-shaped or bulb-like, fleshy; pods fleshy, 2-3-seeded, not grooved; beak long; flowers white or pink.—Intr. from Eu.; escaped cult. locally.

12. CAKILE Ludwig. Sea Rocket

Fleshy maritime or beach annuals with white or purple flowers and short transversely 2-jointed pods, the joint articulating, the upper joint beaked and dropping off; each joint containing 1 cell and 1 seed, or the lower one empty.

1. **C. edentula** (Bigelow) Hook. var. **lacustris** Fernald. A lax or zigzag, low-growing plant; flowers purple; upper joint of the pod long-beaked, ovoid, lanceolate, its articulating surface with 2-4 shallow pits; articulating surface of the lower joint with 2 long and 4 short sharp-tipped processes.—One of the characteristic beach plants of our area, notable on account of its fleshy leaves. In older writings on the dunes this plant has been called "*C. maritima*," "*C. americana*," and "*C. edentula*." The last, the typical species, is found elsewhere on the shores of Lake Michigan, but no specimens from the Indiana coast have been seen.

13. NESLIA Desv. Ball Mustard

Slender annuals with small yellow flowers and subglobose, beaked, 1-celled, 1-seeded pods with reticulated surfaces.

1. **N. paniculata** (L.) Desv. Stem simple up to the inflorescence, stellate-pubescent; leaves oblong, sagittate-clasping; racemes long; pedicels spreading, slender. (*Myagrium* L.)—A sporadic weed in fields and waste places. Nat. from Eu. Summer.

14. ALYSSUM L. Alyssum

Perennials with entire leaves and small white flowers in terminal racemes; pods small, round, each cell with 1 or 2 wingless seeds.

Plants slightly hoary, the hairs 2-forked; petals exceeding the sepals; pods not sharply margined	*A. maritimum* 1.
Plants decidedly hoary, hairs stellate; petals not exceeding sepals; pods sharply margined	*A. alyssoides* 2.

1. **A. maritimum** (L.) Lam. (*Sweet Alyssum.*) Perennial; flowers honey-scented. (*Lobularia* Desv., *Koniga* R. Br., *Clypeola* L.)—Cultivated and escaped. Intr. from Eu. Rare in the Calumet District. Summer.

2. **A. alyssoides** L. Dwarf annual. (*Clypeola* L., *A. calycinum* L.) —Rare in grass lands of the Calumet District. Adv. from Eu.

15. DRABA L. Whitlow Grass

Low herbs with entire or toothed leaves and often stellate pubescence; flowers white or yellow; pod oblong or oval, or even linear, flat, its valves slightly convex or flat, the partition broad; seeds in 2 rows in each cell, marginless.

Flowering stems leafless; petals 2-cleft	*D. verna* 1.
Stems more or less leafy; petals entire.	
Stem leaves a few near the base; raceme short	*D. caroliniana* 2.
Stem leafy to the base of the elongated raceme	*D. brachycarpa* 3.

1. **D. verna** L. Leaves in a dense rosette; scapes short; racemes elongate in fruit. (*Erophila* E. Mey.)—Occasional in sandy waste places, Calumet District. Spring. Nat. from Eu.

2. **D. caroliniana** Walt. Winter annual; leafy stem short; racemes short or corymbose in fruit. (*Tomostima* Nieuwl.)—Sandy fields and waste places. Common. Spring and summer.

Var. **micrantha** (Nutt.) Gray. Petals none; pods minutely rough-hairy. With the species.

3. **D. brachycarpa** Nutt. Winter annual 5-10 cm. long, minutely pubescent; leaves narrowly oblong or the lowest ovate, few-toothed or entire; flowers yellow, small; pods acutish, narrowly oblong, smooth, about as long as the ascending, spreading pedicels; style none; petals sometimes lacking.—Native, or adv. from Southw.(?). A weed in the Calumet District. Summer.

16. CARDAMINE L. Bitter Cress

Glabrous perennials, for the most part, with white or purple flowers and linear flattened pods which open elastically from the base, their valves nerveless and veinless; partitions thick; seeds in 1 row in each cell, wingless.

Base of the plant tuberous or with an enlarged perennial rootstock; flowers showy.	
Leaves simple.	
Petals white.	*C. bulbosa* 1.
Petals rose-purple.	*C. Douglassii* 2.
Leaves pinnate.	*C. pratensis* 3.
Annuals or biennials with slight fibrous roots, no rootstocks or tubers present; flowers small, white.	
Leaflets of the stem leaves few, very narrow, linear, distinct.	*C. parviflora* 4.
Leaflets of the stem leaves 7-11, terminal leaflet obovate, the lateral oblong, tending to be confluent along the rachis.	*C. pennsylvanica* 5.

1. **C. bulbosa** (Schreb.) BSP. (*Spring Cress.*) Stem 1.5-5 dm. tall, glabrous; root leaves cordate-ovate to oblong; lower stem leaves oblong or ovate and somewhat petioled, the upper sessile, lanceolate; petals 7-12 mm. long; pods linear-lanceolate, pointed with slender style and conspicuous stigma; seeds oval.—In cool swampy shady woods near Miller and Mineral Springs, and eastward in dune meadows. May, June.

2. **C. Douglassii** (Torr.) Britton. Similar, taller; root leaves roundish; sepals purplish. (*C. rhomboidea* var. *purpurea* Torr.)—In rich dune woods. Early spring.

3. **C. pratensis** L. var. **palustris** Wimm. & Grab. (*Cuckoo Flower.*) Leaflets numerous, those of the lower leaves rounded and stalked, of the upper oblong or linear or slightly toothed; petals white or roseate, much longer than the sepals; pod 2-3 cm. long, 2 mm. broad. —In rich cool swampy woods, Miller. Spring.

4. **C. parviflora** L. Slender, subsimple, glabrous or slightly pubescent; leaflets of the basal leaves oval or the terminal nearly round, those on the stem narrowly linear; pods erect on ascending pedicels.—In the oak woods. Spring and early summer.

5. **C. pennsylvanica** Muhl. Larger, quite smooth; leaflets 7-11, the terminal obovate, the lateral oblong; pods as in the preceding.—In wet ground of the Calumet District and eastward in dune meadows. Spring and early summer.

17. ARABIS L. Rock Cress

Pods flattened, linear, the valves more or less 1-nerved in the middle or longitudinally veiny; seeds marginless or winged; leaves seldom divided. Our species have small white flowers.

Root-leaves lyrate-pinnatifid	*A. lyrata* 1.
Root-leaves sometimes lyrate.	
Stem leaves partly clasping by the arrow-shaped base.	
Pods recurved-spreading on ascending or merely spreading pedicels	*A. laevigata* 3.
Pods erect, appressed to the stem	*A. glabra* 2.
Stem leaves sessile but not clasping; pods very flat, scythe-shaped, hanging, on rough-hairy pedicels	*A. canadensis* 4.

1. **A. lyrata** L. Plant low, slender, mostly glabrous except the root leaves; stem leaves scattered, with a tapering base, linear or spatulate, entire or a little toothed; petals much longer than the yellowish calyx; pods long and slender, flat, spreading or ascending.—One of the characteristic plants, though inconspicuous, of the high wooded dunes, also to Pine in the Calumet District, on old beach ridges under oaks. Summer.

2. **A. glabra** (L.) Bernh. (*Tower Mustard.*) Tall, glaucous; stem leaves entire; petals small, yellowish white.—Rare, dune meadows. Spring, summer.

3. **A. laevigata** (Muhl.) Poir. Smooth, upright, glaucous; stem leaves lanceolate or linear, mostly toothed, sometimes incised; petals scarcely longer than the calyx. (*Turritis* Muhl.)—Characteristic of dune woods and sandy roadsides. June.

4. **A. canadensis** L. (*Sickle-pod.*) Stem smooth above; stem leaves pubescent, pointed at both ends, oblong-lanceolate, sessile, the lowest toothed; petals much longer than the calyx, oblong-linear.—Dune woods. Summer.

18. DENTARIA L. Pepper-root

Perennials from fleshy, often scaly and tuber-bearing rootstocks; stems bearing 2 or 3 petioled compound leaves at or above the middle; raceme or corymb terminal; pods flat, slender.

1. **D. laciniata** Muhl. Stem leaves in a whorl of 3, 3-cleft, the lateral leaflets again deeply cleft, all gash-toothed; flowers white or faintly pinkish or purplish; petals 1-2 cm. long.—In rich dune woods, rare. Early spring.

CAPER FAMILY (Capparidaceae)

Our species herbs with cross-shaped flowers, as in the *Cruciferae*, and a 1-celled pod with kidney-shaped seeds but without the partition found in the *Cruciferae;* leaves alternate and mostly palmately lobed or divided. Stamens numerous in our species.

1. POLANISIA Raf. Clammy Weed

Malodorous annuals with glandular or clammy hairs; flowers in leafy racemes; petals with claws, notched at the apex; stamens 8-32, unequal; receptacle bearing a gland behind the base of the ovary; pod linear or oblong, turgid, veiny, many-seeded.

1. **P. graveolens** Raf. Plant 0.5-1 m. tall, very sticky; leaves with 3 oblong leaflets; stamens about 11, scarcely exceeding the petals which are of a yellowish white color; filaments and calyx purplish; flowers 4-6 mm. long. (*Cleome dodecandra* Michx., not L.; *Jacksonia trifoliata* Raf.)—An odd but unpleasant weedy plant, found in sandy ground along the edge of Long Lake, in blowouts with *Cycloloma atriplicifolium*, on the shore of Lake Michigan with *Salsola Kali*, and along railroad tracks probably as an adventive weed, though native in other habitats. Summer.

PITCHER PLANT FAMILY (Sarraceniaceae)

Bog plants with hollow pitcher-formed or trumpet-shaped leaves.

1. SARRACENIA L. Pitcher Plant

Perennials, the basal leaves with a wing on one side and a rounded arching hood at the apex; flowering stem naked, 1-flowered, flower nodding; sepals 5 with 3 bractlets at the base, colored, persistent; petals 5, oblong or obovate, incurved, deciduous; stamens numerous; ovary compound, 5-celled, globose, crowned with a short style which is expanded at the summit into a broad petal-like umbrella-shaped body with 5 angles and 5 delicate rays terminating under the angles in little hooded stigmas; fruit a capsule with a glandular surface, 5-celled, many-seeded.

1. **S. purpurea** L. (*Side-saddle Flower, Huntsman's Horn.*) Leaves curved, greenish with purplish veins, their hoods erect, open, round heart-shaped, covered by reflexed bristles; flowers globose, deep purple, the petals fiddle-shaped, arched over the greenish-yellow style.—In sphagnum bogs from East Chicago to Mineral Springs and perhaps to and beyond Michigan City. Summer.

The plants are insectivorous. Insects entering the leaves find their exit blocked by the stiff downward pointing hairs, and are in time digested by the enzymic liquids of the plant, which, however, is not dependent on insects for subsistence. The leaves are generally half full of water and drowned insects.

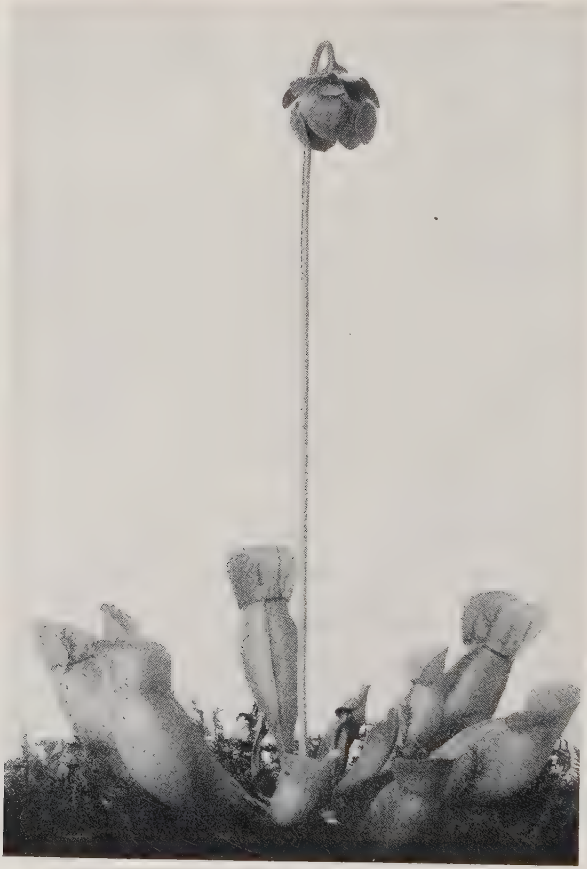


FIG. 17. PITCHER PLANT (*Sarracenia purpurea*)

SUNDEW FAMILY (Droseraceae)

Bog herbs with glandular hairs and leaves which uncoil from a roll, as the ferns do; flowers regular, 5-merous, with an overlapping calyx which tends to persist in a withered state; anthers fixed by the middle and turned outward; styles or stigmas twice as many as the placentae; fruit a 1-celled capsule.

1. DROSERA L. Sundew

Low perennials or biennials, the leaves all in a tuft at the base, clothed with reddish gland-bearing bristles; stem leafless, bearing the flowers in a 1-sided raceme-like inflorescence which nods at the undeveloped apex so that the newest flower is always uppermost; stamens 5; styles 3-5, deeply 2-parted, hence appearing like twice as many, stigmatose on the inner surface; capsule 3- (5-) valved; seeds numerous. Insectivorous plants, which entrap insects on the gleaming hairs, the drops being a digestive juice. This juice curdles milk and is often used for that purpose in Europe.

Leaf-blades as broad as or broader than long..............	*D. rotundifolia* 1.
Leaf-blades distinctly narrower than long...............	*D. longifolia* 2.

1. **D. rotundifolia** L. Stem 1-3 cm. tall, 1-25-flowered; leaves nearly round, abruptly narrowed to the hairy petioles; flowers white or pinkish, 4-7 mm. broad; seeds very slender, chaff-like.—A pretty and curious little plant found in sphagnous bogs and ditches throughout. Summer. This and the following yield a purple stain to paper.

2. **D. longifolia** L. Stems 0.2-2 dm. tall; leaves spatulate-linear, tapering to the petioles, the stems 0.2-2 dm. tall, 1-20-flowered; flowers white; seeds reddish-brown. (*D. intermedia* Hayne.)—Less common than the preceding, in sphagnous bogs from Miller to Mineral Springs.

STONECROP FAMILY (Crassulaceae)

Glabrous herbs, succulent except in our first genus, with perfectly symmetrical flowers, the petals (sometimes none in ours) and pistils equaling the sepals or calyx-lobes in number (3-20) and the stamens of the same number or twice as many, the carpels (except in the first genus) being quite distinct from each other (in this regard differing from the similar *Saxifragaceae*); the perigynous disk of the *Saxifragaceae* replaced by little scales, one behind each carpel; fruit dry and dehiscent; pods opening down the ventral suture. Flowers cymose, small; leaves sessile, alternate, without stipules.

Carpels united, forming a 5-celled capsule; plant not fleshy..	*Penthorum* 1.
Carpels distinct; leaves and stems thick and succulent......	*Sedum* 2.

1. PENTHORUM L. Ditch Stonecrop

Tall weed-like perennials with scattered leaves and yellowish green flowers loosely spiked along the upper side of the cyme branches; calyx lobes 5; petals none; stamens 10; pistils 5, united to form a 5-angled horned 5-celled capsule.

1. **P. sedoides** L. Stem angled below, 1.5-6 dm. tall; leaves lanceolate, acute at both ends, finely serrate, veiny; cymes 3-forked; sepals triangular-ovate.—A peculiar plant most unlike other *Crassulaceae* in habit, though closely similar in flower. Frequent in low grounds and sandy marshes both among the high dunes and in the northern Calumet District. Summer.

2. SEDUM L. Stonecrop

Perennial smooth and thick-leaved herbs with cymose or 1-sided inflorescence; calyx lobes and petals 4-5, the latter generally narrow and acute; stamens 8-10.

1. **S. acre** L. (*Wall Pepper.*) Moss-like plant, spreading over the ground; leaves very small, alternate, overlapping on the branches, ovate, very thick; petals yellow.—A European garden plant escaped from cult. and nat. in the Calumet District. June, July.

RIVER WEED FAMILY (Podostemaceae)

Aquatics growing on stones in running water, resembling seaweeds or mosses, or liverworts, the minute naked flowers expanding from a spathe-like involucre, producing a 2-3-celled, many-seeded, ribbed capsule.

1. PODOSTEMUM Michx. River Weed

Leaves 2-ranked; flowers solitary, nearly sessile in a tubular, sac-like involucre, without petals or sepals; stamens 2, borne on one side of the stalk of the ovary, with long filaments united more than halfway, and 2 short sterile filaments, one on each side; stigmas 2, awl-shaped; capsule pedicelled, oval, 8-ribbed, 2-celled; seeds minute, very numerous.

1. **P. ceratophyllum** Michx. Leaves horny, dilated into a sheathing base, forking into thread-like divisions; plant of firm texture, like a seaweed, olive green, attached to stones by fleshy disks which take the place of roots.—Rare, in the Grand Calumet and Little Calumet Rivers. Summer.

SAXIFRAGE FAMILY (Saxifragaceae)

Herbs with alternate or opposite leaves and no stipules, and regular chiefly 5-merous flowers, the calyx free from or adherent to the ovary; stamens and petals inserted on the calyx; stamens 5 or 10; carpels fewer than the sepals; fruiting carpels separate, dry, capsular; ovary 1-3-celled, generally 2-celled.

This family has been defined to include a miscellany of elements, among which is the *Ribesiaceae*, but is here restricted to the following genera.

Stamens 5.	
Flowers solitary	*Parnassia* 5.
Flowers in paniculate cymes	*Heuchera* 2.
Stamens 10.	
Petals none; little subaquatic plant with opposite leaves	*Chrysosplenium* 4.
Petals present.	
Petals comb-toothed; leaves opposite	*Mitella* 3.
Petals entire	*Saxifraga* 1.

1. SAXIFRAGA L. Saxifrage

Leaves chiefly basal, clustered, on short or broadly-margined petioles, pinnately veined; flowers white, in cymes on naked or nearly leafless stems.

1. **S. pennsylvanica** L. (*Swamp Saxifrage.*) 3-6 dm. tall, with thickish obscurely toothed oblanceolate leaves narrowed at the base into a short, broad petiole; cymes in large oblong panicles, at first clustered, then expanding; petals small, linear-lanceolate, greenish. (*Micranthes* Haw.)—Frequent locally, in swamps and ditches, often with the cinnamon fern, from the Calumet District to and beyond Michigan City. May.

2. HEUCHERA L. Alum Root

Principal leaves basal, cordate or roundish with dilated margins and on narrow petioles; flowering branches lateral; flowers in small clusters borne in a panicle, greenish or purplish; petals spatulate; styles 2, slender; capsule many-seeded, 1-celled, opening between its two beaks.

1. **H. hispida** Pursh. (*Rock Geranium.*) Stem 3-9 dm. tall, granular-pubescent as are the petioles, not hairy and even glabrous below; leaves round-kidney-shaped, with shallow rounded lobes; calyx 6-8 mm. long; stamens short.—Sandy prairies of the Calumet District. July.

H. hirsuticaulis (Wheelock) Greene, which is hirsute with long whitish hairs and has long-exserted stamens, is found on the southern borders of our area, and may well be looked for within them.

3. MITELLA L. Mitrewort. Bishop's Cap

Plants with stalked basal leaves and naked stems or a single pair of opposite leaves on the stem; flowers white, very small, in racemes; calyx adherent to the base of the ovary, 5-cleft; petals slender; stamens in our species 10, included.

1. **M. diphylla** L. Low, hairy, with heart-shaped, 3-5-lobed leaves; leaves 2, opposite, sessile; flowers white, racemed.—A dainty inconspicuous little plant, rare in rich mossy woods at Miller and possibly eastward to Mineral Springs. May.

4. CHRYSOSPLENIUM L. Golden Saxifrage

Low, spreading, smooth plants with tender succulent leaves and solitary or leafy-cymed flowers; calyx lobes 4 (5); stamens 8-10, very short, inserted on a conspicuous disk; capsule inversely heart-shaped or 2-lobed, flattened.

1. **C. americanum** Schwein. Stem slender, creeping and forking; leaves principally opposite, roundish or somewhat heart-shaped, ob-

scurely crenate-lobed; flowers distant, greenish tinged with yellow or purple.—In low mossy woods, under sour gums, edges of bogs, etc., from Clarke to Tamarack Sta. May.

5. PARNASSIA L. Grass of Parnassus

Perennial smooth herbs with entire, chiefly basal leaves and solitary flowers on long slender stems which often bear one sessile leaf; sepals persistent, slightly united at the base; petals spreading, a more or less cleft gland-bearing scale at the base of each stamen; stigmas 4; capsules 4-valved; seeds numerous.

1. **P. caroliniana** Michx. 1.5-6 dm. tall; leaves thick and leathery, ovate or roundish or subcordate, spoon-shaped; petals ovate-oblong, 10-18 mm. long, white veined with purple and gold.—A beautiful little flower of limy bogs and margins of sloughs, from Pine to Mineral Springs.

CURRANT FAMILY (Ribesiaceae)

Shrubs with alternate leaves without stipules, and regular 5-lobed calyx, often colored, and five yellow petals inserted in the throat of the calyx; stamens 5, alternate with the petals; ovary 1-celled; fruit a berry.

1. RIBES L. Currant. Gooseberry

Low, frequently prickly shrubs with palmately lobed leaves, these often in fascicles on the branches; calyx tube adherent to the ovary and withering-persistent, as are the stamens, on the crown of the berry; petals small.

Peduncles 1-4-flowered; racemes elongate; stems usually spiny, at least below the leaves; fruit not disarticulating from the pedicels (gooseberries).	
Calyx lobes shorter than the tube; fruit generally prickly ..	*R. Cynosbati* 1.
Calyx lobes as long as or exceeding the tube; fruit generally smooth..	*R. hirtellum* 2.
Racemes many-flowered; stems mostly without spines below the leaves; fruit disarticulating from the pedicel (currants)..	*R. americanum* 3.

1. **R. Cynosbati** L. (*Prickly Gooseberry, Dogberry.*) Straggling shrub 1-2 m. tall, with slender infra-axillary spines 0.5-1 cm. long and round-ovate, softly pubescent, deeply 3-5-lobed leaves which are subcordate at the base; racemes 2-6 cm. long, loose; berries large, with long prickles or rarely smooth. (*Grossularia* Mill.)—In rich cool woods, especially around tamarack bogs. Spring.

2. **R. hirtellum** Michx. (*Smooth Gooseberry.*) Low shrub with spines 3-8 mm. long, and thin pubescent or smooth and shining thick leaves with 5-7 obtuse lobes; petioles glandular-hairy; flowers greenish yellow to dull purple; fruit about 1 cm. thick, reddish purple

when ripe. (*Grossularia oxycanthoides* Mill., *R. huronense* Rydberg.) —An edible-fruited species with whitish prickles in groups of 3, or single, or sometimes none. Rich woods and tamarack bogs. Spring; fruit ripe in summer.

3. **R. americanum** Mill. (*Wild Black Currant.*) Low erect shrub with unarmed branches; leaves nearly round, sharply 3-5-lobed, the lobes dentate-serrate, glabrous above, resinous-dotted beneath; flowers greenish white or yellowish; fruit globose, smooth, black. (*R. floridum* L'Her.)—An edible-fruited species. In rich cool woods, infrequent. Spring; fruit ripe in summer.

Var. **mesochora** Nieuwl. Leaves larger, more deeply and sharply cut; racemes long; flowers widely scattered; sepal lobes long and very narrow.—A shrub with straggling branches, slender habit and grayish white bark, blooming two weeks later than the species. In tamarack bogs at Mineral Springs. It is said to be endemic to this station.

WITCH HAZEL FAMILY (Hamamelidaceae)

Shrubs or trees with simple alternate leaves and deciduous stipules; flowers perfect or polygamous, in axillary clusters or heads, the calyx adhering to the base of the ovary, the petals inserted on the calyx, narrow; stamens twice as many as the petals and half of them transformed into scales; ovary consisting of 2 pistils united below, forming a 2-beaked, 2-celled, woody capsule opening at the summit, with a single bony seed in each cell.

1. HAMAMELIS L. Witch Hazel

Tall shrubs or small trees with straight-veined leaves and yellow flowers, the petals strap-shaped, 4; perfect stamens short, 4; calyx 4-parted, with 2 or 3 bractlets at its base; 4 stamens without anthers are generally found; capsule pubescent.

1. **H. virginiana** L. Shrub 2-7 m. tall with bark smooth except on fissured old specimens; twigs at first rusty-pubescent, finally smooth or nearly so; winter buds puberulent; leaves oval or nearly round, rounded or notched at apex, unequally oblique at base, at first stellate-pubescent, finally glabrous above and nearly so beneath; margin toothed or sinuate; petals long and narrow, crinkled; seeds black.—Frequent in dune woods and sometimes in thickets of the Calumet District; flowers in November-December, when the leaves are off most trees; fruits set in spring and persist till fall.

Var. **orbiculata** Nieuwl. Shrub with blackish-ashy branches, glabrous except at the summit, where tomentulose; leaves roundish, firm, almost leathery, 1.5-5 cm. long, often broader than long, the apex obtuse or rounded; margin dentate or erose-undulate; leaves densely rusty-hairy or glabrous. —Described and known only from Tamarack Sta.

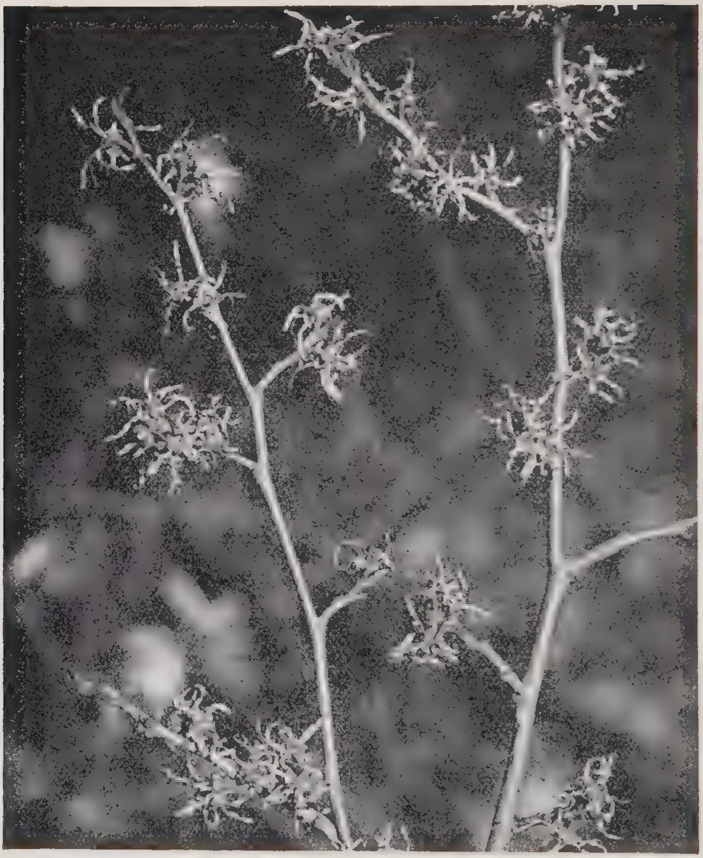


FIG. 18. FLOWERING BRANCH OF WITCH HAZEL (*Hamamelis virginiana*)

ROSE FAMILY (Rosaceae)

Trees, shrubs, or herbs, with alternate stipulate leaves (stipules often early deciduous), and regular flowers with generally 5 sepals united at the base (often accompanied by bracteoles, the whole appearing like 10 sepals); petals 5, separate; stamens distinct, numerous (rarely few), inserted on the calyx; pistils 1 or many, distinct or united and combined with the calyx tube.

This is the fourth largest family in our area, the second largest of dicotyledonous plants, and in spring is decidedly the most conspicuous family in the flora.

Trees or shrubs, or at least soft-woody.
Leaves simple, at most somewhat lobed.
Soft-woody low shrubs; fruit of dry carpels.
Shrubs with shredding bark; leaves palmately lobed; carpels inflated .... *Physocarpus* 6.
Bark not shredding; leaves not lobed; carpels not inflated .... *Spiraea* 7.
Hard-wooded, thick-stemmed, tall shrubs or trees; fruit more or less fleshy or if rather hard at least mealy as in the hawthorns.
Calyx tube adnate to the ovary and crowning the fruit which is a pome (i. e., seeds imbedded in a fleshy tissue, as in apples).
Armed; fruits hard and bony .... *Crataegus* 4.
Unarmed or somewhat thorny; fruits mealy and soft.
Flowers racemose .... *Amelanchier* 3.
Flowers corymbose, or cymose-umbellate .... *Pyrus* 2.
Calyx tube free from the ovary, not crowning the fruit which is a drupe (i. e., a "stone" imbedded in a fleshy tissue, as in plums) .... *Prunus* 1.
Leaves compound; shrubs.
Leaves palmate or sometimes 3-5-pinnate; stems soft-woody and prickly .... *Rubus* 8.
Leaves pinnate, the leaflets generally 5 or more, or if fewer then the stems not prickly.
Flowers yellow; prickles none .... *Potentilla* 9.
Flowers white or pink; stems prickly .... *Rosa* 5.

Herbs, mostly with compound leaves.
Leaves simple .... *Rubus* 8.
Leaves variously compound.
Leaves (except the small ones on leafy runners) all basal.
Petals white; fruit juicy .... *Fragaria* 12.
Petals yellow; fruit spongy, not juicy .... *Duchesnea* 13.
Stems leafy.
Leaves pinnate or sometimes palmate, but the fruit not juicy.
Calyx not prickly-hooked; bracteoles subtending the sepals.
Styles not elongating nor persistent after flowering; fruit not prickly-hooked .... *Potentilla* 8.
Styles elongated, plumose, persisting after flowering; fruit prickly-hooked .... *Geum* 11.
Calyx with marginal prickly hooks but not bracteolate; fruit prickly-hooked .... *Agrimonia* 10.
Leaves palmately 3-foliolate; flowers white; fruit juicy. *Rubus* 8.

1. PRUNUS L. Plums. Cherries

Petals clawed, spreading; stamens 15-20; pistil solitary; calyx tube free from the ovary; fruit a drupe, with juicy flesh and a bony stone.

The plums and cherries are, like the willows, of great ecological importance in this area and have practical importance as sand binders.

KEY TO FLOWERS AND YOUNG LEAVES

- Flowers in racemes, appearing after the leaves which are coiled in bud.
  - Petals obovate........ *P. serotina* 4.
  - Petals roundish........ *P. virginiana* 5.
- Flowers in umbels or corymbs, appearing with or before the leaves.
  - Flowers small; petals 4-6 mm. long.
    - Flowers in corymbs; leaves curled in bud........ *P. pennsylvanica* 7.
    - Flowers in sessile umbels.
      - Tree 2-5 m. tall, somewhat thorny; leaves folded in bud........ *P. angustifolia* 3.
      - Shrubs 1.5 m. tall or less, unarmed; leaves curled in bud.
        - Leaves blunt, obovate........ *P. susquehanae* 8.
        - Leaves acuminate........ *P. pumila* 9.
  - Flowers larger; petals 8-16 mm. long; leaves folded in bud.
    - Petals 8-10 mm. long........ *P. americana* 1.
    - Petals 12-15 mm. long.
      - Calyx lobes entire or nearly so........ *P. Cerasus* 6.
      - Calyx lobes glandular-serrate........ *P. nigra* 2.

KEY TO MATURE LEAVES

- Leaves mostly rather long-acuminate; trees or sometimes shrubs, with leaves usually broadest near the middle and serrate all the way around to the base.
  - Leaves flat-extended.
    - Teeth gland-tipped, mostly double, the serratures thick.
      - Petiole bearing 1 or 2 red glands near the blade........ *P. nigra* 2.
      - Petiole glandless........ *P. serotina* 4.
    - Teeth not gland-tipped, consisting of simple serratures.
      - Thorny, with nearly obovate leaves........ *P. pennsylvanica* 7.
      - Unarmed, with oblong-lanceolate leaves........ *P. angustifolia* 3.
  - Leaves trough-like, half-folded........ *P. americana* 1.
- Leaves very short-pointed or obtusish; shrubs or at most small trees.
  - Leaves serrate all around, not broadest near the end, rounded at base; bark gray.
    - Inner bark bad-smelling; shrub........ *P. virginiana* 5.
    - Inner bark not bad-smelling; tree........ *P. Cerasus* 6.
  - Leaves serrate and broadest above the middle, cuneate at base; bark of twigs reddish, the inner bark not bad-smelling.
    - Leaves short and blunt, obovate, paler and glaucous below........ *P. susquehanae* 8.
    - Leaves rather larger, acuminate, scarcely paler below........ *P. pumila* 9.

KEY TO MATURE FRUIT

Stone more or less plano-convex or somewhat turgid, but always with a distinct suture down the side, as well as a slight margin on the opposite side (plums).	
Stone distinctly flattened; fruit 1.8 cm. long or more.	
Skin without bloom; stone wrinkled; fruit 1.8-2.5 cm. long	*P. americana* 1.
Skin with a slight bloom; stone smooth; fruit 2.5-3 cm. long	*P. nigra* 2.
Stone smooth, somewhat turgid and less flattened; fruit about 1.5 cm. long or less, with a slight bloom	*P. angustifolia* 3.
Stone globose, never flattened, without a distinct suture down one side, though often slightly ridged (cherries).	
Fruits in long racemes, without a bloom, the stone marginless and smooth, thick-ovate.	
Fruits purplish black	*P. serotina* 4.
Fruits red	*P. virginiana* 5.
Fruits in small umbels, the stone slightly roughened or smooth, slightly margined.	
Trees; fruits many in corymb, light cherry red.	
Fruits globose	*P. pennsylvanica* 7.
Fruits depressed-globose, fairly large	*P. Cerasus* 6.
Shrubs, not over 1.5 m. high; fruits 2-5 in sessile fascicles.	
Fruit purple or black	*P. susquehanae* 8.
Fruit claret red	*P. pumila* 9.

1. **P. americana** Marsh. (*Wild Plum.*) Shrub or tree, maximum height 10 m.; bark dark brown; branches spiny; leaves firm, elliptical-oval, 4-10 cm. long, taper-pointed, sharply toothed; flowers white, 2.5 cm. across, in sessile 2-5-flowered umbels, the petals obovate and irregularly erose; fruit red or yellow, 1.8-2.5 cm. long; skin thick and tough; flesh yellow, juicy and acidulous. Flowers appearing before leaves.—A beautiful tree, of handsome shape, the flowers showy, the fruit edible, gathered for jellies. Many cultivated strains are descended from it; the wood is hard, strong, brown and lustrous. In sandy woods, Lake and Porter Cos. Flowers in May; fruit ripe in fall.

2. **P. nigra** Ait. (*Canada Plum.*) Tree attaining 10 m.; bark light gray to brown; leaves elliptic to obovate, 6-12 cm. long, with double glandular teeth, sharply pointed; flowers 1.5-2.5 cm. broad, white, in 3-5-flowered umbels; petals as in the preceding; fruit subglobose, 2.5-3 cm. long; skin thick, orange to red, with a slight bloom. Flowers appear before the leaves.—A beautiful tree; its flowers are large, early, and very fragrant, appearing in May; fruits in August or September, gathered for preserving. Many cultivated plums are descended from it; wood strong, hard, brown. In sandy woods of Porter Co.

3. **P. angustifolia** Marsh. var. **Watsoni** (Sarg.) Waugh. (*Chickasaw Plum.*) A somewhat spiny, dwarf, rigidly branched shrub with a maximum height of 8 m.; bark breaking into dark brownish-red scales; leaves lanceolate, firm, sharply pointed, beset with small gland-tipped teeth; two glands near the base of the blade on the leafstalk; petals clawed, white, obovate; flowers appearing before the

leaves, in 2-4-flowered, almost stemless umbels; fruit red, glossy, but with a slight bloom; flesh subacid and juicy.—Native of the Atlantic coast and eastern slopes of the Appalachians, introduced many years ago at Dune Park to bind sand along the Lake Shore and Michigan Southern railroad; it has now naturalized itself along the banks of the Little Calumet at Dune Park. Wood worthless; fruit is sold in the southern markets. Flowers in May; fruit in midsummer.

P. hortulana Bailey, a species of vague definition, possibly a group of hybrids, has been reported as naturalized and established at Dune Park.

4. **P. serotina** Ehrhart. (*Wild Black Cherry.*) Shrub or tree attaining maximum height of 25 m.; bark dark red; leaves oval to oblong or lanceolate, taper-pointed, with 2 glands at the base of the blade, on the leaf-stalk; flowers appearing when the leaves are partly expanded, in racemes 10-15 cm. long, each flower 8 mm. broad; fruit purple or black, astringent but edible. (*Padus* Roemer.)—A fine tree, the bark medicinally used, the wood hard, strong, light, making a beautiful furniture of yellowish red and satiny appearance often replacing mahogany. Common on the tops of high active dunes as a shrub, and found in the richer forests as a tree, also on the sand plains about Clarke. Flowers in May, fruit in July and August.

5. **P. virginiana** L. (*Choke Cherry.*) Similar to the preceding; shrub or small tree, the fruit astringent and inedible; stone smooth; flowers rather fetid. (*Padus* Mill.)—Dunes, thickets, and margins of swamps, common. Flowers in May; fruit in midsummer.

Var. **demissa** (Walp.) Torr. Leaves thicker, more rounded, serrate with straight teeth; fruit red, large, edible. (*P. demissa* Walp.)—Woods back of the dunes. Tremont, Keiser.

6. **P. Cerasus** L. (*Morello Cherry.*) A low, round-headed tree; flowers large; fruit acid.—Nat. from Eu., and established at Dune Park acc. to Pepoon.

7. **P. pennsylvanica** L. f. (*Wild Red, Fire,* or *Bird Cherry.*) Tree 6-10 m. tall; bark light red-brown; leaves oblong-lanceolate, pointed, finely and sharply serrate, shining green and smooth on both sides; flowers appearing with the leaves, numerous in a cluster on long stalks; fruit globose, light red, size of a pea, with meager sour flesh; stone globular.—A pretty little tree with showy small flowers and soft, light, pale brown wood. It is important as a foresting agent and springs up after forest fires and thus protects the seedlings of more useful trees. Found in swampy places around Tamarack Station and thence eastward through the dunes to Michigan. A shrub on the dunes; a tree in rich dune woods. Flowers April-June. Fruit ripe in August.

8. **P. susquehanae** Willd. (*Sand Cherry.*) Low shrub; leaves pale beneath; flowers 2-4 in a cluster; fruit 1 cm. in diameter, without a bloom, inedible. (*P. cuneata* and *P. rupestris* Raf.)—On dunes around Indiana Harbor, not common. Flowers in May; fruit in July and August.

9. **P. pumila** L. (*Dwarf Cherry.*) Low erect shrub with red twigs, similar to the preceding; fruit inedible.—A very handsome plant in

flower, the large blossoms appearing with the leaves in May. Fruits ripe in August. It is one of the chief spring flowers of the dunes, abundant in the area of high and active dunes. This is not the prostrate shrub of the Atlantic coastal dunes that has been called *P. pumila* but which is really *P. depressa* Pursh.

Amygdalus Persica L., the peach, of Old World origin, sometimes shows a tendency to naturalize itself.

2. PYRUS L. Pear. Apple. Chokeberry

Trees or shrubs, our species with simple leaves; flowers in corymbs or umbel-like cymes, the calyx-like receptacle urn-shaped, bearing the 5 sepals; petals roundish or obovate; stamens numerous; styles 2-5; fruit a large fleshy pome (apple-like or pear-like) or smaller and berry-like, the 2-5 cells imbedded in the flesh, papery or cartilaginous and mostly 2-seeded. In our species the calyx persists in fruit.

This large genus is often subdivided into several genera, of which the cultivated pear, the orchard apple, the chokeberry, and the mountain-ash are severally typical. The first and last are not represented in our area outside cultivation, though the pear, *Pyrus communis* L., is sporadically self-sown along the railroad at Clarke, acc. to Pepoon.

Cymes simple; midrib of the upper leaf-surface not glandular; fruit large, apple-like (*Sect. Malus;* apple).	
Leaves and outer surface of the calyx lobes glabrate......	*P. glaucescens* 1.
Leaves, at least below, and outer surface of the calyx lobes clothed with persistent gray tomentum.	
Leaves usually narrowed at the base; pedicels slender...	*P. ioensis* 2.
Leaves rounded or cordate at the base; pedicels stout...	*P. Malus* 3.
Cymes compound; midrib of upper leaf-surface glandular; fruit small, berry-like (*Sect. Adenorachis;* chokeberry).	
Leaves pale and permanently canescent-tomentose below; pedicels and calyx also canescent-tomentose.......	*P. arbutifolia* 4.
Leaves soon glabrous beneath, the pedicels and calyx also nearly or quite smooth.........................	*P. melanocarpa* 5.

1. **P. glaucescens** Rehder. (*Wild* or *American Crab Apple.*) Bark fissured and scaly; tree not over 4 m. tall, contorted, very branchy, generally thorny; leaves ovate to triangular, mostly rounded or cordate at base, finely to deeply serrate or almost lobed, at first hairy, finally smooth; flowers 5 or 6 in a cluster, very fragrant, white or rose-color, 3-4 cm. broad; fruit 2-4.5 cm. thick, fragrant, covered with a waxy bloom, yellow-green, depressed-globose, without angles. (*Malus* Rehder; *P. coronaria* L. in part, as interpreted by Gray's Man. ed. 7, but not as restricted by Rehder.)—A beautiful little flowering tree, the fruits of which are often preserved; it is rare in our area; it grew formerly near the Indiana-Illinois line close to the lake, in what is now known as South Chicago. The only specimens now known from our area are from Michigan City, close to the lake shore; it may be looked for elsewhere near the shore, however. May, June.

2. **P. ioensis** (Wood) Bailey. (*Iowa Crab Apple.*) Tall shrub or small tree with a few thorns; leaves oblong to ovate-oblong, 4-10 cm. long, broadly cuneate at the base or sometimes rounded, dentate-crenate or doubly so, slightly pubescent above, becoming glabrous, dark green, rugose, below densely white-tomentose, and remaining so at least on the veins; corymbs 2-5-flowered, with pubescent pedicels; calyx densely white-tomentose on both sides; flowers as in the preceding; fruit 2-3.5 cm. thick, subglobose, without angles, green. (*Pyrus coronaria* var. Wood; *Malus* Britton.)—Occurs rarely among the dunes from Dune Park to the Indiana-Michigan state line. May, June.

3. **P. Malus** L. (*Common Apple.*) Small tree, generally with rounded crown except when crowded among other trees; leaves similar to the preceding, but rounded or heart-shaped at base; pedicels woolly; flowers pink-flushed. *Malus* Britton, *M. sylvestris* Mill.)—Escaped cult., or persistent around abandoned orchards encroached on by the woods, Tremont, Michigan City, etc. May. Introduced from Europe.

4. **P. arbutifolia** (L.) L. f. var. **atropurpurea** (Britton) Robinson. (*Chokeberry.*) Shrub 1-3 m. tall; leaves oblong-oblanceolate, acute, glandular-serrate, green and smooth above; flowers small, white or reddish in few-flowered cymes; fruit 8-10 mm. in diameter, claret to purplish-black. (*Adenorachis atropurpurea* Nieuwl., *Aronia* Pers.)—Frequent around tamarack bogs, edges of lagoons, and in moist thickets. May; fruit showy in late fall.

5. **P. melanocarpa** (Michx.) Willd. (*Chokeberry.*) Similar in habit, but lower; leaves broadly oblong and acuminate to spatulate-oblanceolate and almost blunt; fruit similar, dark purple or black. (*Aronia nigra* Britton; *P. nigra* Sarg., *Adenorachis* Nieuwl.)—In swampy ground, Gary, Clarke, Mineral Springs, Tremont; less common than the preceding. Flowering and fruiting habits similar, but generally two weeks later.

3. AMELANCHIER Medic. Shad Bush. Service Berry

Trees or shrubs with simple leaves and in our species racemes of white flowers; petals obovate to oblong, rarely linear; stamens numerous, short; styles 5, united below; ovary 5-celled, apparently 10-celled but with a false partition between each real one; berry edible, like a small apple.

Teeth of leaves coarse; veins conspicuous, usually straight, parallel or close together, short intermediate ones few or none (alder-like); summit of the ovary woolly; hypanthium open, saucer-shaped; sepals revolute when petals fall . . . . *A. sanguinea* 1.

Teeth of the leaves fine, 5-12 per cm. on average leaves; veins irregular, unequally distant, usually with frequent intermediate shorter ones (pear-like); summit of the ovary various.

  Leaves densely white-tomentose when young, becoming green; lower pedicels 7-18 mm. long, in fruit 10-25 mm. long.

Leaves rounded at the apex; hypanthium large at flowering time, 3-5 mm. in diameter; sepals narrow, triangular or lanceolate, acute or recurved from the middle at the time when the petals fall; petals short, 7-9 mm. long; shrubs	*A. oblongifolia* 2.
Leaves short-acuminate; hypanthium small, 2.5-3 mm. in diameter, campanulate, not constricted below; sepals broad, oblong, triangular, obtuse or abruptly acute or abruptly short-acuminate, reflexed from the base when petals fall; summit of ovary glabrous; petals elongated, 10-14 mm. long; shrubs or trees.	*A. canadensis* 3.
Leaves nearly or quite glabrous from the first, ovate, oval, or elliptical, and very acutely or commonly shortly acuminate at maturity, brownish-purple, half grown at flowering time; hypanthium slightly constricted on the very young fruit; sepals lanceolate, usually reflexed from the base when the petals fall; lower pedicels 15-33 mm. long; trees or tall shrubs	*A. laevis* 4.

A. humilis Wiegand. Shrub with oval-oblong leaves, the veins of which become irregular just before reaching the margin, with petals 7-10 mm. long; otherwise similar to *A. sanguinea*. May possibly occur within the limits of our area and should be looked for.

1. **A. sanguinea** (Pursh) DC. Scrawny, slender, arching shrub, 1-2.5 m. tall, the stems solitary or few together; leaves orbicular, the upper veins running straight to the coarse, spreading teeth; petals 11-20 mm. long, narrow; sepals 4 mm. long; fruit dark purple. (*A. spicata* of Gray's Manual, not Lam.)—Has been collected at Pine, and may occur elsewhere. Early spring.

2. **A. oblongifolia** (T. & G.) Roemer. Stems 1.2-8 m. tall, forming alder-like clumps; leaves oblong, with 10-15 pairs of veins, rounded at apex, teeth fine, 25-40 on each side; hypanthium campanulate, large at flowering time, 3-5 mm. in diameter; sepals narrow, triangular, mostly erect; petals short, 7-9 mm. long; summit of ovary glabrous, or slightly woolly.—Has been collected at Liverpool, and may occur elsewhere. Spring.

3. **A. canadensis** (L.) Medic. Tree or shrub 3-12 m. tall; leaves when young folded lengthwise and brownish-purple, ovate to ovate-oblong, somewhat heart-shaped at base, finely and sharply serrate, 4-9 cm. long, 3-6 cm. wide; flowers large, in drooping racemes; fruit crimson or purplish, on elongated pedicels. (*Pyrus Botryapium* L. f.)—A characteristic common tree of the larger dune forests, with pretty flowers in May, and light reddish brown bark. Found also sometimes along the branches of the Calumet River.

4. **A. laevis** Wiegand. Characterized in the key.—In woods and swamps, Miller to Michigan City. Spring.

4. CRATAEGUS L. Hawthorn

Thorny shrubs or small trees with simple but usually lobed leaves, those on young shoots often markedly different in shape and lobing; flowers in corymbs; calyx tube cup- or bell-shaped, adhering to the

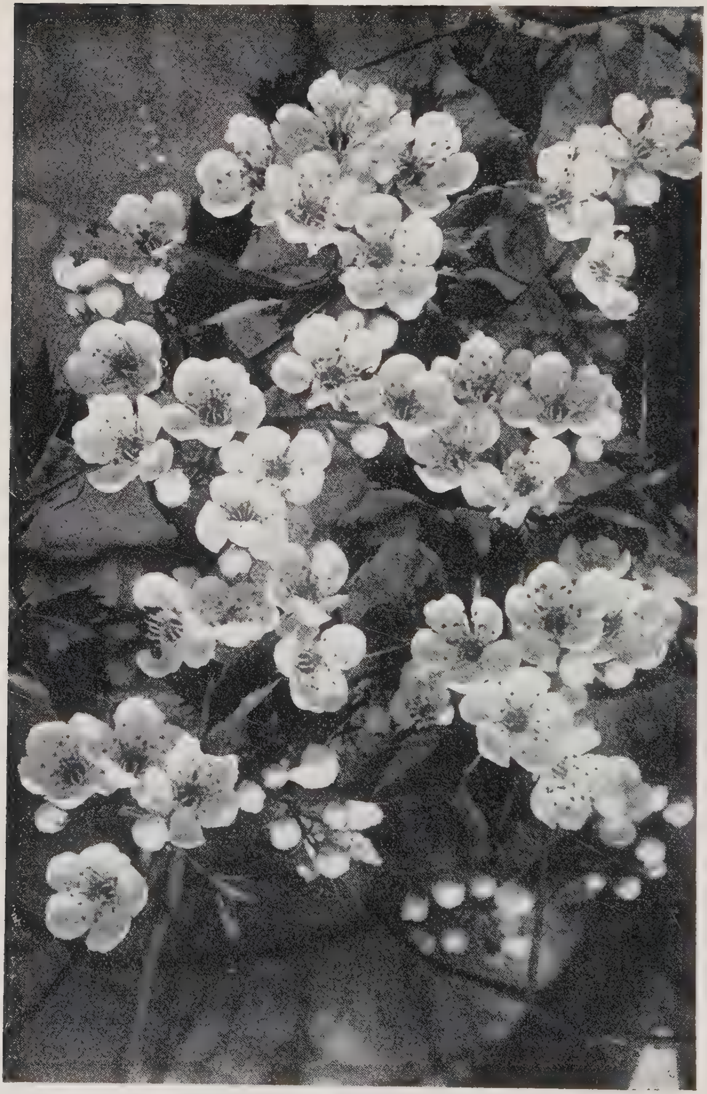


FIG. 19. HAWTHORN (*Crataegus* sp.)

carpels, withering-persistent on tip of the fruit; petals white or rarely pink, roundish; fruit a small pome containing 1-5 bony nutlets each of which contains 1 seed.

A perplexing genus in which many species have been proposed, but only the following have been clearly recognized in our area. The dunes are uncongenial to hawthorns, but on the limy prairies around Chicago many species occur. Some of these may yet be taken within our area.

Calyx lobes serrate.	
Corymbs 1-7-flowered.	
Calyx lobes leaf-like, the margins deeply and jaggedly cut	*C. uniflora* 5.
Calyx lobes smaller, not leaf-like, the margins merely glandular-serrate	*C. intricata* 4.
Corymbs many-flowered.	
Leaves broadest at the middle	*C. calpodendron* 8.
Leaves broadest at the base	*C. pruinosa* 7.
Calyx lobes entire or sometimes a little glandular-margined but not glandular-serrate.	
Leaves broadest toward the middle	*C. macrosperma* 6.
Leaves broadest toward the base.	
Leaves thick, dark green and shining above; corymbs glabrous	*C. Crus-galli* 1.
Leaves thin, light yellow-green or gray-green and dull above; corymbs pubescent or tomentose.	
Leaves bright yellow-green above	*C. cuneiformis* 2.
Leaves gray-green above	*C. punctata* 3.

1. **C. Crus-galli** L. Tree or shrub with spreading branches forming a broad crown, and dark gray scaly bark; spines many, long, chestnut brown; leaves sharply serrate except at the base; leaf-stalk slightly winged; flowers numerous; calyx lobes long, entire; stamens 10-20; styles 2-5; fruit globose, red, the flesh greenish, thin and hard, but edible.—A variable and hybridizing species. Dune woods and prairie thickets. May.

2. **C. cuneiformis** (Marsh.) Eggleston. A hybrid between the preceding and the following, and variably resembling both; corymbs pubescent, many-flowered; flowers 1.2-1.5 cm. across; stamens 10-15, with dark purple anthers; fruit about 8 mm. thick, brick red, pear-shaped-ellipsoid; nutlets usually 3. (*C. pausiaca* Ashe.)—Rare, in low wet woods back of the dunes, Tremont. May.

3. **C. punctata** Jacq. A flat-topped tree with grayish brown bark and shorter spines; leaves impressed-veined above, pubescent beneath, obovate or rhombic-ovate, tapering to the winged petiole; fruit red or yellow, cylindric-globose.—In thickets, prairies, etc., Lake Co., occasional. The fruit has thick hard flesh and is not edible. May.

4. **C. intricata** J. Lange. Irregularly topped shrub or small tree with occasional thorns; leaves scabrous, elliptic-ovate, lobed, doubly serrate, bright yellow green above; corymbs and calyx villous; flowers about 2.5 cm. across; stamens about 10 with light yellow anthers; fruit ultimately dark reddish brown, 8-10 mm. thick; nutlets 3-4.

(*C. coccinea* of Gray's Manual and old Dune reports, but not L.)—Occasional in low woods back of the dunes. May.

5. **C. uniflora** Muench. Shrub with straight, slender, often leafy thorns; leaves spatulate, small, rounded at the tip, shiny above, at first pubescent, then scabrate; corymbs tomentose; flowers 1-1.5 cm. across; stamens about 20, with white anthers; styles 5-7; fruit subglobose, pubescent, 1-1.5 cm. thick, yellowish green; nutlets 5-7. (*C. tomentosa* of Gray's Manual.)—Occasional, in sandy soil near Lake Michigan. May.

6. **C. macrosperma** Ashe. Shrub or small tree not over 7 m. tall with ascending branches and strong thorns; leaves dark yellow green above, paler beneath, elliptical-ovate or broader; stamens 5-10; fruit ellipsoidal or pear-shaped, scarlet to crimson, often glaucous.—A most variable species with edible fruits, occasional in woods near the high dunes. May.

7. **C. pruinosa** (Wendl.) K. Koch. Irregularly branched shrub or small tree, with many chestnut-brown curved thorns; leaves elliptic to broadly ovate, acute at the apex, doubly serrate, glabrous, blue-green, or, in youth, bronze-green; corymbs glabrous; stamens 20, usually pink; styles 3-5; flowers about 2 cm. across; fruit ultimately scarlet or purplish, 1.2-1.5 cm. thick; nutlets 4-5.—Common, on sandy soils, in the southwestern prairie part of our area, and on the Valparaiso morain lying just outside it. May.

8. **C. calpodendron** (Ehrh.) Medic. Tree or shrub with irregularly ascending branches and numerous dark, curved thorns; leaves rhombic-ovate, acute, and serrate, or those on vegetative shoots shallowly toothed and less acute, pubescent or scabrate above, dull light green; corymbs white-tomentose; stamens usually 20 with small pink anthers; styles 2-4; fruit 8-10 mm. long, bright red, globose; nutlets 2-3. (*C. Chapmani* Ashe; *C. tomentosa* of many auths.; *C. tomentosa* var. *Chapmani* Beadle.)—Rare, in low woods back of the dunes, Tremont. May.

5. ROSA L. Rose

Text contributed by Dr. Eileen Erlanson

Erect shrubs, generally with subterranean rootstocks; stems usually prickly; leaves alternate, odd-pinnate; stipules adnate to the petiole; calyx tube urn-shaped, constricted at the throat, becoming fleshy in fruit, 5-lobed; petals 5, showy; stamens many; pistils numerous, ripening as bony achenes within the fleshy calyx-tube and together with it forming the fruit or hip.

Flowers appearing early in June; calyx lobes erect and persistent on the usually smooth hips.
  Stems usually unarmed except at the base.
    Hips subglobose.................................. *R. blanda* 1.
    Hips tapering.................................... *R. blanda* var. *glandulosa.*
  Stems bristly throughout.............................. *R. blanda* var. *hispida.*
Flowers appearing in last half of June or in July; calyx lobes spreading after flowering and tardily deciduous from usually glandular-bristly hips.

Paired prickles beneath stipules generally straight and slender; serrations of leaflets coarse (about 7-18 per side); low shrubs of dry habitats.
  Leaflets glabrous or with only scattered hairs.
    Serrations simple.................................. *R. carolina* 2.
    Serrations compound and gland-tipped .... *R. carolina* var. *glandulosa.*
  Leaflets pale and finely pubescent beneath............ *R. Lyoni* 3.
Paired prickles beneath stipules generally recurved and flattened; serrations of leaflets fine (about 13-35 per side); shrubs usually 1 m. high or more, in swampy ground... *R. palustris* 4.

1. **R. blanda** Ait. Stems 3-15 dm. high, unarmed or with few scattered bristles at base; stipules broad; leaflets 5-7, rarely 9, simply and coarsely serrate; flowers corymbose or solitary; petals about 2.5 cm. long; hips globose, usually pendulous when ripe and about 12-14 mm. in diameter.—On open dunes throughout. Flower early June, fruit September.

Var. **glandulosa** Schuette. Hips tapering at one or both ends. May be a hybrid form involving the northern *R. acicularis.* Var. **hispida** Farwell. Stems covered with numerous short bristles. Both forms occur scattered among dunes, and are sometimes labeled "*R. acicularis*" in herbaria.

2. **R. carolina** L. Stems low, 3-10 dm., usually with scattered short bristles and straight paired prickles; leaflets 5-7, rarely 9, very variable in shape, usually acute and glabrous, sometimes with a few hairs, sometimes shiny above; serrations coarse and simple; flowers solitary on old wood, forming terminal corymbs on new growth; petals 2-2.5 cm.; pedicels and erect hips usually covered with stiff glandular hairs, rarely smooth; outer sepals more or less lobed. (*R. humilis* Marsh.; not *R. carolina* of Gray's Man.)—Infrequent, wooded dunes and dry ground. Flower end of June, fruit September. Semidouble forms occur, one of which from the dunes has been registered by the American Rose Society under the name "Captain Robinson" in honor of the collector.

Var. **glandulosa** (Crep.) Farwell. Petiole and rachis glandular-hispid; leaf serrations compound and gland-tipped. (*R. serrulata* Raf.)—Of occasional occurrence.

3. **R. Lyoni** Pursh. Similar to the preceding. Stipules, petiole and rachis villous; leaflets sometimes pubescent on both sides or glabrate above and pale and villous beneath.—Infrequent, on wooded dunes, Lake Co. Flower end of June or early July.

4. **R. palustris** Marsh. (*Swamp Rose.*) Stems usually tall, 3-25 dm., forming thickets; stipules narrow; leaflets mostly 7, rarely 5 or 9, paler and more or less finely puberulent beneath; flowers usually corymbose, leafy-bracted; hips glandular-hispid, subglobose, about 1 cm. broad. (*R. carolina* of Am. auths., not L.)—Along streams and ditches. Flower mid-July, fruit October.

6. PHYSOCARPUS Maxim. Ninebark

Shrubs with simple palmately lobed leaves, and umbel-like corymbs of white flowers; calyx short, persistent; stamens 30-40; carpels 1-5, inflated, 2-valved.

1. **Physocarpus opulifolus** (L.) Maxim. Much branched; old bark exfoliating in long thin strips; leaves ovate to nearly round, more or less 3-nerved, irregularly double-crenate, nearly smooth above, pubescent beneath; flowers white, about 25 in a corymb; calyx half as long as the mature pods which are smooth and 2-3-seeded, the seeds shining light brown. (*Opulaster* Kuntze.)—Occasional in sandy thickets, Pine, Clarke and Miller and occasional eastward in dune thickets. May, June. (Includes the indistinct var. *intermedius* [Rydb.] Robinson.)

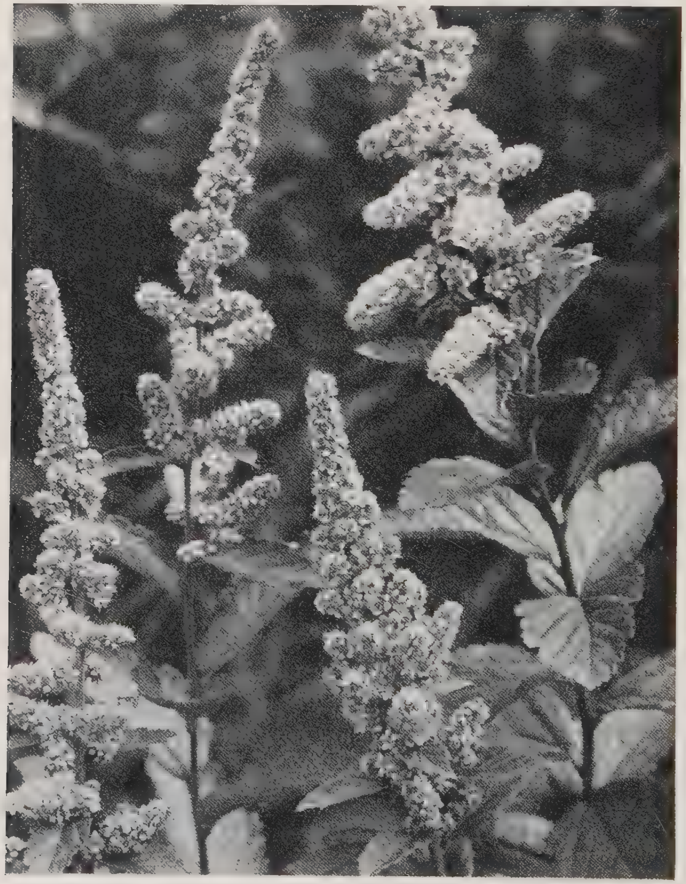


FIG. 20. HARDHACK (*Spiraea tomentosa*)

7. SPIRAEA L. Spiraea

Shrubs with simple leaves and white or rose-colored flowers in racemose panicles, the calyx short, persistent; stamens 10-50; pods 5-8, few-several-seeded.

Leaves densely tomentose and white or tawny beneath.....	*S. tomentosa* 2.
Leaves smoothish and scarcely paler beneath..............	*S. alba* 1.

1. **S. alba** DuRoi. (*Meadow-sweet.*) 3-12 dm. tall, with tough yellowish-brown stems; leaves lance-oblong, 5-7 cm. long, firm, finely serrate; inflorescence tomentose, in the form of a thyrse; flowers numerous, white, 6-8 mm. across. (*S. salicifolia* of auths., not L.)—Common in wet, boggy or peaty soil, and sandy low prairies, throughout. July, August.

2. **S. tomentosa** L. (*Steeple Bush, Hardhack.*) Tomentose, about 1 m. tall; leaves ovate-lanceolate to narrowly oval, 3-7 cm. long, 1-3 cm. broad, coarsely crenate-serrate, dark-green, rugose, and puberulent above, densely white or sometimes rusty-tomentose beneath; narrow panicle with tomentose branches; flowers pink or rarely white (forma *albiflora* Macbr.), about 4 mm. broad; capsule woolly.—Occasionally found in the same situations as the preceding, flowering in early summer. With us more commonly represented by var. **rosea** (Raf.) Fernald. Inflorescence much more open; mature capsule glabrous. Common, frequently with the preceding.

8. RUBUS L. Bramble. Raspberry. Blackberry

Herbs or more often soft-woody plants with or without prickles and with simple or more commonly 3-7-foliolate leaves, the leaflets palmately or pedately arranged; flowers terminal or axillary, racemed or panicled; calyx withering-persistent below the fruit; petals white or pink; carpels inserted on a convex receptacle and ripening into a compound fruit of drupelets each containing a small seed.

The stems are generally biennial, the shoots or "canes" of the first year's growth mostly barren and bearing more numerous leaflets. In our area only the following are clearly recognized; but several other species may occur.

- Stems herbaceous, not prickly; leaves 3-foliate; fruit red, not separating readily from the receptacle. (*Sect. Cylactis*) *R. pubescens* 3.
- Stem soft-woody, more or less prickly, or if unarmed the leaves simple.
  - Fruit separating readily from the receptacle (*Sect. Idaeobatus;* raspberries).
    - Tall armed plants.
      - Lateral leaflets petioled; petals shorter than the sepals.................................. *R. occidentalis* 1.
      - Lateral leaflets sessile; petals as long as the sepals.... *R. idaeus* var. *strigosus* 2a.
    - Dwarf plant, almost unarmed .... *R. idaeus* var. *anomalus* 2b.
  - Fruit not readily separating from the receptacle (*Sect. Eubatus;* blackberries, dewberries).

Canes erect or arched-ascending.
Pedicels armed with stoutish or slender but long and sharp bristle-like prickles.................. *R. floricomus* 4.
Pedicels generally not prickly, at most glandular-hispid or with a few weak bristles.
Pedicels copiously glandular-hispid............... *R. allegheniensis* 5.
Pedicels glandless or practically so.
Lower surface of leaflets downy................ *R. frondosus* 6.
Lower surface of leaflets glabrous or nearly so at maturity.
Inflorescence a subcylindric raceme........... *R. canadensis* 7.
Inflorescence a corymb..................... *R. Randii* 8.
Canes trailing or tending to be prostrate at the end.
Fruit red, small; leaves thick and shiny; flowers several in corymbiform racemes................... *R. hispidus* 9.
Fruit black.................................... *R. flagellaris* 10.

1. **R. occidentalis** L. (*Black Raspberry, Black-cap.*) Glaucous throughout; stems rooting at tips, armed with hooked prickles but not bristly; leaflets generally 3, ovate, pointed, whitened-downy beneath, coarsely doubly serrate; fruit purple black, or rarely amber yellow in the forma *pallidus* (Bailey) Robinson.—In rich cool woods, Mineral Springs, Keiser and perhaps elsewhere. Flowers May, June; fruit (sweet) July.

2a. **R. idaeus** L. var. **strigosus** (Michx.) Maxim. (*Red Raspberry.*) Bark of new canes smooth, glaucous or lustrous; leaves white-downy; prickles bristle-form, not much thickened at base; fruit light red, or rarely amber colored in the forma *albus* (Fuller) Fernald. (*Batidaea strigosa* Greene.)—This has often been mistaken for and reported as *R. idaeus* var. *aculeatissimus* Regel & Tiling. In rich cool woods and thickets, occasional throughout. Flowers May, June; fruit July, delicious.

2b. **R. idaeus** L. var. **anomalus** Arrhenius. Only 1-3 dm. tall, scarcely or not at all armed; leaves 3-foliolate with rounded, ovate, obtuse leaflets, or simple and broadly ovate with 3 shallow lobes. (*Batidaea heterodoxa* Greene.)—A curious little plant occurring in only one or two spots in this country; from our area known only from a limestone outcrop at Clarke.

3. **R. pubescens** Raf. (*Dwarf Raspberry.*) Stems only 1-3 dm. tall or trailing and longer; leaves pedately 3- (5-) foliolate, with rhombic-ovate or ovate-lanceolate acute leaflets, these thin, smooth, doubly serrate; petals small, erect; flowers solitary or few, terminal; fruit of a few rather large drupelets. (*R. triflorus* Richards.; *R. americanus* Britton.)—An odd little plant resembling a raspberry by its red fruit, but the fruit, like that of a blackberry, does not separate from the receptacle. Frequent in woods and thickets throughout. Flowers July; fruit in August, but acid.

4. **R. floricomus** Blanchard. (*Blackberry.*) 8-14 dm. tall, erect, rigid, the canes purplish or green, angled and grooved, stoutly armed with needle-like, firm, straight prickles; branchlets, pedicels, petioles, and often midnerves of leaves beneath, hooked-prickly; leaves rusty-velvety below, firm, the leaflets coarsely toothed; raceme corymb-like,

7-12-flowered; pedicels spreading, softly villous-tomentose, like the rachis and pedicels; fruit subglobose, the drupelets few and large.—Occasional in dry, open thickets. May.

5. **R. allegheniensis** Porter. (*Blackberry.*) Tall shrub with purplish old canes armed with straight stout prickles; leaflets somewhat villous above and decidedly velvety beneath; flowers 2.5-4 cm. broad, somewhat racemose; fruit of many small delicious drupelets. (Incl. the nearly distinct *R. nigrobaccus* Bailey.)—Thickets near the lake shore from Whiting to the high dune country. Flowers May; fruit August.

6. **R. frondosus** Bigel. (*Blackberry.*) Canes arching; prickles straightish, stout; leaflets nearly smooth above, velvety beneath; racemes elongated, cylindrical, the lower half leafy-bracted; flowers 2.5-3 cm. across; fruit subglobose, the drupelets few.—In sandy oak woods near the lake shore, Lake Co. Flowers in May; poor fruit in August.

7. **R. canadensis** L. (*Blackberry.*) Usually a stout, erect or recurving plant with few or no prickles on the glabrous old canes; leaflets with fine, even, sharp teeth, smooth on both sides, the 5-foliolate leaves caudate-acuminate; racemes leafy-bracted at base, long-cylindric; flowers 2.5-4 cm. across; fruit short-cylindric or subglobose, with large and juicy drupelets, but acid. (*R. amabilis* and *R. amicalis* Blanchard.)—In thickets, frequent throughout; flowers May; fruit August.

8. **R. Randii** (Bailey) Rydb. (*Blackberry.*) A slender, weakly armed plant with suberect and roundish and often reddish canes, these often recurved and rooting at the tip; leaflets irregularly and sharply toothed, smooth on both sides; inflorescence corymbosely racemed, few-flowered, leafy-bracted at base; pedicels flexuous; flowers 2-3 cm. broad; fruit subglobose, of few drupelets.—Shaded and somewhat sandy ground, Dune Park, and perhaps elsewhere. Flowering and fruiting as in the preceding.

9. **R. hispidus** L. (*Dewberry.*) Elongate stems prostrate, beset with backwardly hooked prickles; branches more or less erect; leaflets smooth, firm, thick, dark green and shining above; corymbiform racemes few-flowered; flowers 1.5-2 cm. across; fruit small, of a few small sour reddish-purple drupelets.—Common throughout in woods, thickets, open ground, and bogs. Flowers in June; poor fruit in August.

10. **R. flagellaris** Willd. (*Dewberry.*) Stems roundish, rather woody, becoming prostrate; prickles straightish, backwardly set, strong, needle-like; fruiting branches erect, 1-3 dm. tall; leaflets thin, doubly and finely serrate, smooth to villous below; racemes corymbiform and leafy, or the flowers sometimes few or one; flowers 2-3 cm. across; fruit short-cylindric, or subglobose, with few or many juicy black drupelets. (*R. villosus* of auths., not Thunb.)—Common throughout by roadsides, in fields and thickets. Flowers in May, good fruit in August.

9. POTENTILLA L. Cinquefoil

Herbs or rarely shrubby, with compound leaves and cymose or solitary flowers, their parts in fives or fours; calyx flat, with bractlets in its sinuses; achenes on a dry receptacle.

- Plant an erect shrub.................................... *P. fruticosa* 7.
- Plant not shrubby or if slightly woody, then decumbent.
  - Petals purple, persistent.............................. *P. palustris* 6.
  - Petals yellow or white, deciduous.
    - Leaves silvery-silky beneath.
      - Stems leafy; leaves palmate....................... *P. argentea* 2.
      - Leaves nearly all radical, pinnate.................. *P. Anserina* 5.
    - Leaves not silvery-silky beneath, sometimes grayish or paler.
      - Stems strictly erect.
        - Leaves 3-foliolate .... *P. monspeliensis* 1.
        - Leaves digitately 5-9-foliolate .... *P. recta* 4.
      - Stems procumbent; leaves 3-foliolate but apparently 5-foliolate by the parting of the lateral leaflets *P. canadensis* 3.

1. **P. monspeliensis** L. Stem hirsute, 2-9 dm. tall; leaflets incisely serrate; cymes close and leafy; calyx large; petals small; stamens 15-20. (*Tridophyllum* Greene.)—Annual or biennial inconspicuous herb, infrequent in dune meadows and in open soil of the Calumet District. May-August.

2. **P. argentea** L. (*Silvery Cinquefoil.*) Stems ascending or depressed, 1-5 dm. tall, paniculately branched above; leaflets 5, green above, covered with white wool beneath, margins revolute; cymes loose and leafy; calyx white-tomentose; corolla large.—A very pretty species, apparently not common in our region; wooded dunes, in and around Michigan City. June-September.

3. **P. canadensis** L. Suberect or creeping, with ascending shoots, often rooting at the tip; stem hirsute; leaflets canescent-silky beneath, glabrous above; flowers solitary on long axillary peduncles, smallish. (*Callionia* Greene.)—In dune woods, throughout the season.

Var. **simplex** (Michx.) T. & G. Stem covered with short appressed hairs; leaflets merely short-appressed-villous on the veins beneath.—A common weed-like variety of fields and roads.

4. **P. recta** L. Stems very leafy, 3-7 dm. tall, loosely hirsute, as are the leaves on both surfaces, the lower somewhat paler; cymes compact, scarcely leafy; calyx hirsute; corolla 2 cm. broad, showy.—A bright-flowered species nat. from Eu. along roadsides throughout. June-August.

5. **P. Anserina** L. var. **sericea** Hayne. (*Silver Weed.*) Spreading by jointed runners; tomentose; leaves all radical; leaflets 7-21, with smaller ones interposed, silky-silvery beneath; peduncles very long, axillary, bearing smallish, solitary, yellow flowers. (*Argentina* Rydb., *P. Argentina* Huds.)—A rare and strikingly beautiful subaquatic plant of the Calumet District and east to Dune Park in dune sloughs. June-August.

6. **P. palustris** (L.) Scop. (*Marshlock, Cowberry.*) Stems stout, ascending from a decumbent rooting perennial base, 1-6 dm. long; leaflets 5-7, serrate, paler and more or less pubescent beneath; flowers few in an open cyme; calyx 2-2.5 cm. broad, dark purple inside. In fruit the hairy receptacle enlarges and becomes spongy. (*Comarum* L.)—A handsome, low-growing plant in sphagnum and cranberry bogs; Pine, Miller, and eastward to and beyond Furnessville. June-August.

7. **P. fruticosa** L. (*Prairie Weed, Shrubby Cinquefoil.*) Shrub 1-8 dm. tall, the thin bark rather shaggy; stems much branched; leaves pinnate; leaflets 5-7, silky, usually whiter beneath, the margins entire and revolute; cymes terminal, dense, or the flowers sometimes solitary; flowers yellow, 1-3 cm. broad. (*Dasiphora* Rydb.)—A characteristic and beautiful shrub of the dry ridges around Pine; also reported from Miller, but not characteristic of the high dunes. A northern species. June-September.

10. AGRIMONIA L. Agrimony

Perennial herbs with interruptedly pinnate leaves, crenate-serrate leaflets and small yellow flowers in spikes; calyx tube top-shaped, hardened and furrowed in fruit, its limb 5-cleft and closed after flowering; stamens 5-15; flower bracts 3-cleft.

- Leaflets exclusive of the small intermediate ones 11-13, lanceolate to narrowly lance-oblong................ *A. parviflora* 1.
- Leaflets 5-9, ovate to obovate or elliptic-oblong.
  - Rachis of the inflorescences with minutely glandular puberulence mixed with widely spreading hairs; leaves sparingly pubescent beneath; roots not thickened... *A. gryposepala* 2.
  - Rachis appressed-villous or glandular-puberulent, without long spreading hairs; leaves densely and softly pubescent on both surfaces; roots thickened toward the end.. *A. mollis* 3.

1. **A. parviflora** Ait. Stem 7-12 dm. tall, leafy, hirsute; leaflets narrow, numerous, with small ones of various sizes; calyx abruptly deflexed from the ascending stalk, 4-5 mm. long in fruit.—In sandy fields and roadsides, frequent, especially eastward. Midsummer.

2. **A. gryposepala** Wallr. Stem as above; leaflets smoothish, thin, large; fruiting calyx 1 cm. long. (*A. hirsuta* Bicknell.)—Wooded dunes, frequent. Midsummer.

3. **A. mollis** (T. & G.) Britton. 6-15 dm. tall; stem grayish-pubescent; leaflets oblong, obtuse; fruiting calyx 2-3 mm. long.—Dry ground and open woods throughout. Midsummer.

11. GEUM L. Avens

Perennials with deeply 5-cleft bell-shaped or flattish calyx with reflexed lobes; stamens numerous, as are the achenes which are heaped on a conical dry receptacle, the whole forming a sessile fruiting head; styles forming long jointed tips, these bent near the middle, the upper joint hairy and deciduous, the lower hooked and persistent.

- Stipules small; petals small, white.
  - Stem sparingly hairy; fruiting receptacle densely hairy... *G. canadense* 1.
  - Stem bristly-hairy; fruiting receptacle nearly glabrous.... *G. virginianum* 2.
- Stipules large; petals large, yellow; receptacle of the fruit downy.. *G. strictum* 3.

1. **G. canadense** Jacq. Stem 5-10 dm. tall; leaves soft-pubescent beneath, or glabrate; basal leaves of 3-5 leaflets, pinnately arranged, or undivided; stem leaves 3-parted or -lobed, sharply toothed.—In rich dune woods or in oak forests and thickets. Midsummer.

2. **G. virginianum** L. Similar; stem stout; lower and root leaves variable, generally pinnate, the upper stem leaves 3-parted, incised; petals inconspicuous, not as long as the sepals.—Thickets, edges of woods, low meadows; frequent. Midsummer.

3. **G. strictum** Ait. 9-15 dm. tall, somewhat hairy; root leaves interruptedly pinnate, the leaflets wedge-obovate, stem leaves with 3-5 rhombic-ovate or oblong, acute leaflets; stipules deeply incised; petals obovate, exceeding the calyx; fruiting receptacle downy.—A pretty species, local in our area; meadows, east of Michigan City, and along the Little Calumet, E. Gary. Midsummer.

12. FRAGARIA L. Strawberry

Perennials, the leaves all radical; stems producing runners; flowers cymose, white, the sexes often partially or wholly separated, even on different plants; calyx flat, 5-cleft, with as many bractlets at the sinuses, appearing 10-cleft; petals 5, roundish; stamens numerous; styles deeply lateral; receptacle of the fruit much enlarged and conical, becoming fleshy and scarlet (a strawberry), bearing the minute dry achenes scattered over its surface.

(Most of the cultivated strawberries are hybrids between *F. vesca*, *F. chiloensis*, and *F. virginiana*.)

1. **F. virginiana** Duchesne. (*Wild Strawberry.*) Rhizome simple, thick; runners often long; leaflets firm and thickish; stems low, generally villous-subappressed; pedicels silky; fruit small but sweet; flowers rather large.—Common in dry open soil or among oak woods, throughout. April. Fruit in June.

Var. **illinoensis** (Prince) Gray. Coarser and larger; a spreading tomentum on pedicels and stems. (*F. Grayana* Vilmorin.)—Common with the species.

13. DUCHESNEA Sm. Indian Strawberry

Perennial herb with leafy runners and 3-foliolate leaves similar to those of the strawberries; calyx 5-parted, the lobes alternating with much larger, leafy, spreading, 3-toothed appendages; receptacle enlarging in fruit and spongy, but not juicy; flowers as in *Fragaria*, but yellow.

1. **D. indica** (Andr.) Focke. Inconspicuous little weed with insipid red fruit.—Rare along marshy roadsides around Tamarack Sta. and perhaps elsewhere. Summer. Nat. from Asia.

BEAN FAMILY (Leguminosae)

Herbs, or less frequently shrubs or trees, with alternate, stipulate, usually compound leaves; flowers sometimes regular and 5-merous (rarely 3-merous; in *Amorpha* petal only 1) but more often papilionaceous (butterfly-like), the calyx of generally unequal, united sepals, the corolla if irregular of 5 or rarely fewer clawed petals, the upper one (standard) enlarged, enclosing the others in bud and generally turned backward, the lateral ones (wings) oblique and exterior to the two lower which are usually united to form the "keel," a somewhat folded, boat-shaped, and often curved petal which encloses the stamens and pistil; stamens 5-10, all free, or united, or 9 united and 1 free, when united forming a tube around the long-cylindric pistil; fruit a legume, that is, a pod splitting by both sutures, or rarely not splitting.

An immense family, including many garden plants and edibles and forage crops grown in our area, many of which may escape or persist. Our native species are most characteristic of dunes and oak barrens and some of the prairies. Few are found on our bogs or around swamps and only three on the shore of Lake Michigan. For the study of the natural subfamilies and tribes standard manuals should be consulted.

- Leaves simple.......... *Crotalaria* 5.
- Leaves variously compound.
  - Leaves 3-foliolate.
    - Leaves digitately 3-foliolate.
      - Herbage glandular-dotted.......... *Psoralea* 10.
      - Herbage not glandular-dotted.
        - Leaflets entire, blackening in drying.......... *Baptisia* 4.
        - Leaflets denticulate or serrate, not blackening in drying.......... *Trifolium* 7.
    - Leaves pinnately 3-foliolate.
      - Leaflets denticulate or serrate.
        - Flowers in dense heads.......... *Trifolium* 7.
        - Flowers not in dense heads.
          - Leaflets (in ours) lanceolate or oblong-lanceolate; pods leathery, wrinkled, 1-2-seeded.......... *Melilotus* 8.
          - Leaflets (in ours) ovate or ovate-oblong; pod curved or coiled, 1-several-seeded.......... *Medicago* 9.
      - Leaflets entire or practically so.
        - Plants twining, prostrate or climbing.
          - Keel straight; style beardless; pods scimitar-shaped.......... *Amphicarpa* 21.
          - Keel curved or spiral; style bearded.
            - Keel elongated, strongly incurved; pods straight.......... *Strophostyles* 22.
            - Keel spirally coiled; pods scythe-shaped.......... *Phaseolus* 20.
        - Plants erect, not climbing or twining.
          - Calyx 2-lipped; pods several-jointed; flowers all of one sort and perfect; leaflets stipellate.......... *Desmodium* 15.
          - Calyx regularly 5-lobed; pods 1-2-jointed; flowers often 2 sorts, the more fertile ones without petals; leaflets not stipellate.......... *Lespedeza* 16.
  - Leaves 5- or more-foliolate.
    - Leaves digitately 5-11-foliolate.
      - Herbage glandular-dotted.......... *Psoralea* 10.
      - Herbage not glandular-dotted.......... *Lupinus* 6.
    - Leaves pinnately foliolate.
      - Leaves simply pinnate.
        - Leaves with an even number of leaflets, without a terminal leaflet (a tendril often present).

Leaves terminating abruptly without a tendril.
Tree or shrub.............................. *Gleditsia* 2.
Herbs.................................. *Cassia* 3.
Leaves terminating in a tendril.
Wings cohering with the keel; style slender, hairy-bearded at the apex............. *Vicia* 17.
Wings free; style dilated upwards, hairy along the inner face....................... *Lathyrus* 18.
Leaves with an odd number of leaflets, terminated by a leaflet.
Trees or shrubs.
Leaves not glandular-punctate; branches spiny. *Robinia* 14.
Leaves glandular-punctate; branches not spiny. *Amorpha* 11.
Herbs.
Leaves glandular-punctate.................. *Petalostemon* 12.
Leaves not glandular-punctate.
Calyx equally 5-toothed; plants not trailing or twining. .... *Tephrosia* 13.
Calyx 2-lipped; plants trailing or twining... *Apios* 19.
Leaves 2-pinnate.
Tree.................................. *Gleditsia* 2.
Herb.................................. *Desmanthus* 1.

1. DESMANTHUS Willd. Prairie Mimosa

Herbs; leaves abruptly pinnate, the leaflets small and very numerous; petioles bearing 1 or more glands, the stipules narrow and long; peduncles axillary, bearing a head of small, greenish-white, regular, perfect or polygamous flowers; calyx bell-shaped; petals 5, distinct.

1. **D. illinoensis** (Michx.) MacM. Practically glabrous; pinnae 6-15 pairs, each pinna bearing 20-30 pairs of leaflets; stamens 5; flowers small; fruiting heads dense; pods curved, 2-6-seeded. (*Acuan* Kuntze; *Acacia* Michx.)—Adv. from Great Plains, along railroad tracks of the Calumet District. May-September.

2. GLEDITSIA L. Honey Locust

Thorny trees with abruptly pinnate leaves and spikes of small greenish polygamous flowers; calyx 3-5-cleft; petals 3-5; stamens as many or twice as many, distinct; pod and seeds flat.

1. **G. triancanthos** L. Large tree with rough bark and stout thorns, these often branched; leaves once or twice pinnate, petioled; leaflets obtuse at both ends, pubescent beneath, crenulate; racemes drooping; pod shining, smooth, twisted, many-seeded.—Native of eastern U. S., but in our area intr., and escaped around old dwellings. May-July.

3. CASSIA L. Senna

Flowers yellow, with 5 almost separate sepals and 5 almost equal petals; stamens often unequal, 5-10, some of them often imperfect; pod many-seeded, flat in our species.

Flowers in short axillary racemes, the upper in panicles; foliage glabrous, with large leaflets and deciduous stipules . . .	*C. marilandica* 1.
Flowers in small clusters above the axils; leaflets small and somewhat sensitive to the touch; stipules persistent.	
Stamens 5, equal; flowers small, on short pedicels.	*C. nictitans* 2.
Stamens 10, 4 short; flowers larger, on longer, slender pedicels.	*C. fasciculata* 3.

1. **C. marilandica** L. (*Wild Senna.*) Perennial, 8-12 dm. tall; leaflets 5-9 pairs, obtuse, narrowly oblong; flowers wide open and bright yellow; 3 upper anthers imperfect; pods hairy and slightly curved.—In low grounds, southeast of Gary acc. to Pepoon. Summer.

2. **C. nictitans** L. (*Wild Sensitive Plant.*) Erect or reclining, branching annual with more or less pubescence; leaflets narrowly oblong, 12-44; flowers seldom widely opened, rather inconspicuous. (*Chamaecrista* Moench.)—In dry open sandy soil, especially of the Calumet District. Summer.

3. **C. fasciculata** Michx. (*Partridge Pea.*) Similar, but often taller and more erect, some of the showy bright yellow petals generally purple-spotted at the base; leaflets 20-30, the 4 short stamens bearing yellow anthers, the 6 longer, purple ones. (*Chamaecrista* Greene; *Cassia Chamaecrista* of auths. and old dune reports, but not of L.)—A pretty little plant, in dry open soil throughout. Midsummer.

4. **BAPTISIA** Vent. False Indigo

Perennial herbs with standard not larger than the wings, its sides reflexed; stamens 10, all distinct; pods inflated, subcylindric, many-seeded, stalked in the persistent calyx.

The blackening of the leaves in drying is characteristic of most species, and denotes the presence of an indigo dye of inferior quality, yet sometimes used in country districts.

Flowers yellow; racemes many, terminal, leafy at base, short and loose.	*B. tinctoria* 1.
Flowers white or creamy; racemes fewer, opposite the leaves.	
Hairy, low; stipules and bracts large, leafy, persistent. . . .	*B. bracteata* 2.
Smooth, tall; stipules early deciduous.	*B. leucantha* 3.

1. **B. tinctoria** (L.) R. Br. Glabrous, erect, succulent, 6-15 dm. tall; leaves petioled; leaflets obovate; stipules minute, soon deciduous; racemes few-flowered; bracts minute, deciduous; flowers about 1.5 cm. long; pods ovoid-globose, long-pointed on stalks longer than the calyx.—Not recently collected in our area; formerly, at least, found in sterile soil near the lake shore, Lake Co. Midsummer.

2. **B. bracteata** (Muhl.) Ell. Bushy-branched and villous throughout; leaves sessile or short-petioled; leaflets oblanceolate, reticulate; racemes mainly lateral, sometimes 3 dm. long; flowers showy, about 2.5 cm. long; pods ovoid, nearly sessile.—A handsome species in dry sandy soil, prairies and oak barrens, occasional throughout. Spring.

3. **B. leucantha** T. & G. Succulent; leaflets oblong-wedge-form, obtuse; racemes lateral, loosely flowered; flowers about 2 cm. long; pod

ellipsoid, long-stalked.—A showy species occurring in dry hollows and on old beach ridges in the Calumet District and in dune meadows. In flower during early summer it is one of the beauties of the region.

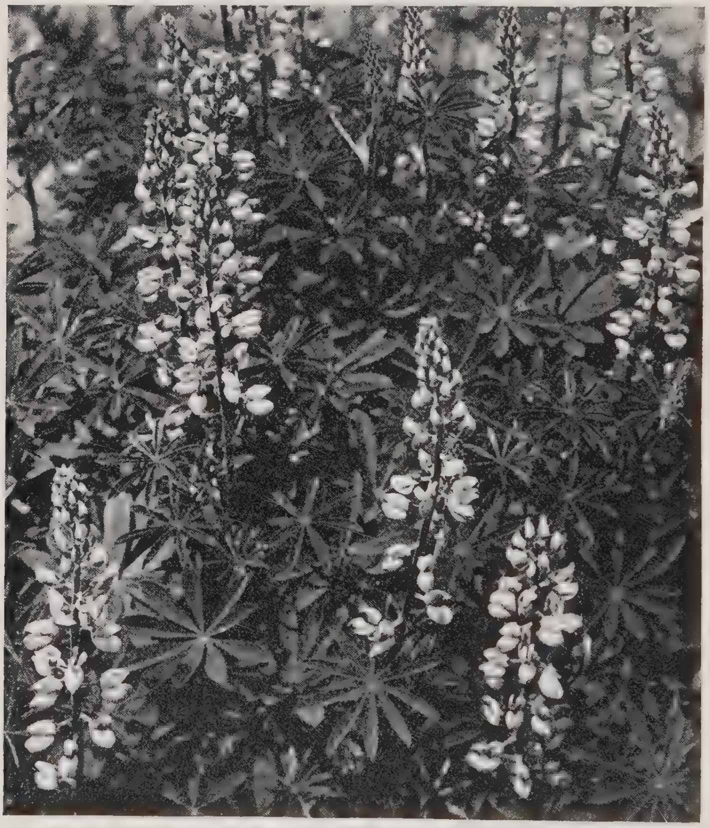


FIG. 21. LUPINE (*Lupinus perennis*)

5. CROTALARIA L. Rattle-box

In our species herbs with racemose yellow flowers and large heart-shaped standard and strongly curved keel; stamens all united, the tube cleft on one side; pod inflated, subcylindric; 5 of the anthers smaller and roundish.

1. **C. sagittalis** L. Annual with spreading hairs, suberect, 7-25 cm. tall; leaves oval or oblong-lanceolate, almost sessile; stipules united and decurrent on the stem, forming together what seems to be one arrow-shaped conspicuous stipule; peduncles few-flowered; calyx equalling the corolla.—Nat. from the Eastern States along railroad lines. Summer and autumn.

6. LUPINUS L. Lupine

Herbs with adnate stipules and showy flowers in terminal racemes; calyx deeply 2-lipped; sides of the standard reflexed; keel scythe-shaped; stamens all united; 5 of the anthers roundish; pod oblong, flattened, constricted between the seeds and hence appearing knotty; leaflets radiating like fingers from a common petiole.

1. **L. perennis** L. (*Wild Lupine.*) Hairy perennial, 3-6 dm. tall; leaflets oblanceolate; raceme elongate; flowers large, purple or blue; pods 5-6-seeded, very hairy, broad.—On dunes and upper beaches or occasional near the Lake in the Calumet District. This beautiful flower is one of the characteristic plants of the high dunes and even out of flower is always conspicuous. Spring and early summer.

Var. **occidentalis** Wats. Stems and petioles very villous.—This nearly endemic variety is perhaps more common in our area than the true species.

7. TRIFOLIUM L. Clover

Tufted or diffuse herbs with adnate stipules and persistent bristle-toothed calyx; corolla withering-persistent, generally small, the petals mostly united below with the stamen-tube; one stamen generally free; pods thin, 1-6-seeded, small, often included in the calyx.

All our species are introduced and behave as weeds or escapes.

Flowers sessile in dense heads.	
Calyx teeth silky-plumose, exceeding the corolla; heads grayish	*T. arvense* 1.
Calyx soon glabrous, not as long as the magenta or rose corolla	*T. pratense* 2.
Flowers pedicellate in looser heads; pedicels reflexed in age.	
Corolla white, roseate or purple.	
Leaflets rounded at apex, ovate; plants strictly erect, without creepers or rooting nodes	*T. hybridum* 3.
Leaflets obovate, or notched at the apex, stoloniferous or rooting at the nodes.	
Flowers 1-1.3 cm. long; corolla red; peduncles rarely more than twice the length of the head	*T. stoloniferum* 4.
Flowers 6-9 mm. long; corolla white or pink; peduncles mostly 3-many times the length of the heads	*T. repens* 5.
Corolla yellow.	
Leaflets all sessile, obovate-oblong	*T. agrarium* 6.
Leaflets stalked, wedge-obovate	*T. procumbens* 7.

1. **T. arvense** L. (*Rabbit-foot* or *Stone Clover*.) 1-4 dm. tall; silky branching annual with oblanceolate leaflets and ovoid-cylindric heads.—Around cities in the Calumet District. Intr. from Eu. Summer and autumn.

2. **T. pratense** L. (*Red Clover*.) Somewhat hairy, ascending, perennial with oval or obovate, generally notched, large leaflets, these having a whitish spot near the center; heads ovoid.—Very common throughout, in fields, farms, roads and streets. Intr. from Eu. Spring to autumn.

3. **T. hybridum** L. (*Alsike Clover*.) Similar to the following (see key), the flowers pink.—Habits and habitats of *T. pratense*. Intr. from Eu.

4. **T. stoloniferum** Muhl. Smooth perennial, with long runners from the base; leaflets broadly obovate or obcordate, minutely toothed; heads loose, white tinged with purple; pods with 2 seeds.—A species native to middle western prairies, this plant may occur naturally in the prairies of the Calumet District; however it is known definitely in our area only from railroad tracks. Summer.

5. **T. repens** L. (*White Clover*.) Smooth perennial with slender stems; petioles and peduncles long; leaves inversely heart-shaped; heads small; calyx much shorter than the white corolla.—Habits and habitats of *T. pratense;* intr. from Eu.

6. **T. agrarium** L. (*Yellow* or *Hop Clover*.) Smoothish annual 1-3 dm. tall, erect; corolla persistent, fading brown.—Around cities, especially in the Calumet District. Nat. from Eu. May-September.

7. **T. procumbens** L. (*Low Hop Clover*.) Similar, pubescent.—Common around cities. Nat. from Eu. May-September.

8. MELILOTUS Hill. Sweet Clover

Annual or biennial herbs with sweet-smelling foliage and small clover-like flowers in spike-like racemes; corolla deciduous; pod 1-2-seeded, leathery, wrinkled, ovoid, longer than the calyx.

Petals yellow, 6-9 mm. long.............................. *M. officinalis* 1.
Petals white, 3-4 mm. long.............................. *M. alba* 2.

1. **M. officinalis** (L.) Lam. (*Yellow Melilot*.) Tall; leaflets obovate-oblong, closely serrate, obtuse; pod practically glabrous, cross-ribbed.—Frequent around cities in the Calumet District. Summer. Nat. from Eu.

2. **M. alba** Desr. (*White Melilot*.) Tall, bushy; leaflets narrowly obovate, serrate, truncate or notched at the apex; pod reticulate.—Common in waste ground. Summer. Nat. from Eu.

9. MEDICAGO L. Alfalfa

Annuals or perennials similar to *Melilotus* but for the pod (see key).

Perennial, upright, smooth; flowers purple; pods twisted.... *M. sativa* 1.
Annual, procumbent, pubescent; flowers yellow; pods kidney-shaped.. *M. lupulina* 2.

1. **M. sativa** L. (*Lucerne.*) Leaflets obovate-oblong.—Cultivated for fodder and often spontaneous around farms, along roads. Spring and summer. Intr. from Eu.

2. **M. lupulina** L. (*Nonesuch, Black Medick.*) Leaflets wedge-obovate, toothed at the apex.—In waste ground around cities. Spring to autumn. Adv. from Eu.

10. PSORALEA L.

Perennial herbs usually more or less glandular-dotted throughout, with 3-5-foliolate leaves, in our species digitately so; flowers in spikes or racemes, blue-purple or white; calyx 5-cleft, persistent, with long lower lobe; pod thick, short, 1-seeded, often wrinkled.

1. **P. tenuiflora** Pursh. Slender, branched, bushy, 6-12 dm. tall, hoary-pubescent, but minutely so and only when young; leaflets linear to obovate-oblong, 1.2-3.5 cm. long; flowers in loose racemes, small; pod glandular.—Prairies of the Calumet District. A western species. June-September.

11. AMORPHA L. Lead Plant

Shrubs with stipellate leaflets of which the midrib is extended to form a minute bristle; calyx persistent, 5-toothed, inversely conical; standard wrapped around the stamens and style (other petals none); stamens all united by their base but free above; pods roughened, 1-2-seeded, oblong, longer than the calyx; flowers showy, in elongated terminal crowded spikes.

1. **A. canescens** Pursh. 3-15 dm. tall, whitened with hoary down; leaflets more than 3, elliptic-oblong, smoothish above, 1-2 cm. long or less, crowded; spikes clustered; flowers purple, the golden anthers showy.—A beautiful plant in sandy hollows and old beach ridges chiefly of the Calumet District. Summer.

12. PETALOSTEMON Michx. Prairie Clover

Mostly perennial herbs with minute stipules and small flowers in dense terminal heads or spikes; calyx 5-toothed; corolla indistinctly papilionaceous; standard heart-shaped or oblong, inserted on the bottom of the calyx, differing from the other 4 petals which are borne on top of the stamen tube on thread-form claws; stamens all united, the tube cleft; pods 1-2-seeded, enclosed by the calyx.

Corolla rose-purple; leaflets 5..........................	*P. purpureum* 1.
Corolla white; leaflets 7-9..............................	*P. candidum* 2.

1. **P. purpureum** (Vent.) Rydb. Smoothish, low-growing; leaflets long and narrow; heads globose-ovoid or short-cylindric; calyx silky-hoary; bracts pointed, not longer than the calyx. (*P. violaceum* Michx., *Kuhnistera* MacM.)—A beautiful little plant of prairies and occurring on beach ridges near the lake in the Calumet District.

Forma **arenaria** Gates. Stem diffuse and spreading.—An ecological variant found in sterile sand exposed to wind action.

2. **P. candidum** Michx. Similar, the bracts longer than the calyx. (*Kuhnistera* Ktze.)—Prairies and old sand ridges of the Calumet District, infrequent. Summer.

13. **TEPHROSIA** Pers. Goat's Rue

Hoary perennial herbs with racemose flowers and 5-cleft calyx; standard scarcely longer than other petals, reflexed, roundish, outwardly silky; stamens all united, or 1 free; pods flat, linear, several-seeded.

1. **T. virginiana** (L.) Pers. (*Cat-gut, Devil's Shoe-string.*) Silky; stem erect, 3-6 dm. tall; leaflets 17-29, linear-oblong; flowers clustered in a dense ellipsoid terminal raceme, large, the standard purple, the wings yellow and pink, the keel white. (*Cracca* L.)—A handsome common plant of dry soil with very long tough roots by which it spreads. General except on prairies, where rare. Spring and summer. Var. **holosericea** (Nutt.) T. & G. Pubescence woolly; leaflets narrower. —At Keiser (Churchill).

14. **ROBINIA** L. Locust

Our species trees with stipular spines and stipellate, ovate leaflets; flowers showy, in axillary pendent racemes; calyx slightly 2-lipped; standard large, round, reflexed, scarcely longer than the other petals; 9 stamens united, one free; pods large, flat, leathery, containing several large seeds.

1. **R. Pseudo-Acacia** L. (*Black Locust.*) Tall tree with tough black cross-furrowed bark; twigs and foliage practically smooth; leaflets 9-19, stalked, large; racemes loose; pedicels slender; flowers large, white, fragrant.—A noble tree with very strong heavy wood; it suckers extensively. Prairies, rich dune woods, frequent around Clarke; planted and escaped around Dyer and Schererville. June.

15. **DESMODIUM** Desv. Tick Trefoil

Perennial herbs with axillary or terminal, often panicled racemes of purplish flowers (turning greenish in fading); calyx 2-lipped; standard obovate; wings adhering to the straight truncate keel; stamens all united below or 1 free; pod deeply lobed on the lower side, separating into flat, reticulated joints, these generally hooked-hairy.

Stalk of the pod many times longer than the slightly toothed calyx and nearly as long as the pedicel, straight on the upper margin but deeply sinuate on the lower, the 1-4 joints concave on the back and half-obovate; plants nearly glabrous; stems erect or ascending; racemes panicled, terminal; stipules deciduous, bristle-like.
  Flowering stems wholly leafless........................ *D. nudiflorum* 1.
  Flowering stems at least in part leafy.

Flowering stems wholly leafy........................ *D. pauciflorum* 3.
Flowering stems leafy to the racemes, but these leafless.. *D. grandiflorum* 2.
Pods practically sessile in the deeply cleft calyx.
Stipules persistent and large as are the conspicuous but deciduous bracts, taper-pointed, ovate or ovate-lanceolate; flowers large............................ *D. illinoense* 4.
Stipules and bracts deciduous, small and inconspicuous or rarely conspicuous before flowering time.
Joints of the pod 3-5, triangular or half-rhombic, longer than broad; flowers medium size; stems erect, 6-15 dm. tall.
Stem and leaves pubescent........................ *D. Dillenii* 5.
Essentially smooth throughout..................... *D. paniculatum* 6.
Joints few, roundish or obliquely oval, 3-5 mm. long.
Stems erect; bracts conspicuous before flowering; racemes densely flowered.
Leaves petioled; leaflets oblong-lanceolate or broader; flowers large (8-12 mm. long)..... *D. canadense* 7.
Leaves sessile; leaflets linear; flowers smaller...... *D. sessilifolium* 8.
Stems ascending but not erect, 3-9 dm. tall; bracts and flowers small; racemes elongated, loosely flowered................................ *D. rigidum* 9.

1. **D. nudiflorum** (L.) DC. Leaves all crowded at the summit of sterile stems; leaflets broadly ovate, blunt, whitish beneath; flowering stems slender, arching; flowers conspicuous. (*Meibomia* Kuntze.)—Common in sandy woods, especially on oak beach ridges. Summer.

2. **D. grandiflorum** (Walt.) DC. Stem tall; leaflets round-ovate or rhombic, taper-pointed, green both sides; flowers showy. (*Meibomia* Kuntze.)—Occasional as on the Little Calumet River bank near Dune Park, wooded dunes, Tremont, thickets, Furnessville. Summer.

3. **D. pauciflorum** (Nutt.) DC. Stem low, ascending; leaflets rhombic-ovate, bluntish, pale beneath. (*Meibomia* Kuntze.)—In sandy woods near Clarke and perhaps elsewhere. Summer.

4. **D. illinoense** Gray. Stem and leaves with a short, rough pubescence; leaflets ovate-oblong, 5-10 cm. long, ashy beneath, obtuse, strongly reticulate and thickish; pods of 3-5 oval joints not over 6 mm. long each, the whole pod 2.5 cm. long or less, both margins sinuate, the lower deeply so. (*Meibomia* Ktze.)—A striking species in dry open soil of the Calumet region. Summer.

5. **D. Dillenii** Darl. Similar to the following; leaves pale beneath. (*Meibomia* Ktze.)—Open woods, Tremont.

6. **D. paniculatum** (L.) DC. Smooth throughout; stem tall, slender; leaflets oblong-lanceolate, tapering to a blunt point, thin; racemes multipaniculate. (*Meibomia* Vail.)—Woods and thickets. Summer.

7. **D. canadense** (L.) DC. 5-15 dm. tall, the stem hairy. (*Meibomia* Kuntze.)—Common in the wooded dunes; its flowers are the largest of the genus in our area. Summer.

8. **D. sessilifolium** (Torr.) T. & G. Stem pubescent; leaflets thick and reticulated, rough above, downy beneath; panicle long-branched. (*Meibomia* Ktze.)—The commonest species in our area; it is not showy. Mrs. Chase notes that the stems are sometimes 1.8 m. long and recumbent. Summer.

9. **D. rigidum** (Ell.) DC. Stem hoary, branching; leaflets ovate-oblong, thickish, reticulated, rough above, hoary beneath. (*Meibomia* Ktze.)—Frequent in dry woods throughout. Summer.

16. LESPEDEZA Michx. Bush-clover

Herbs with sessile leaflets and small white or purple flowers in axillary clusters, heads, or panicles; calyx equally 5-cleft; stamens united except 1 free; pods oval, flat, reticulated, generally seated in the calyx, 1-2-jointed, the lower joint if present hollow and stalk-like. Apetalous polygamous flowers often present later in the season.

Flowers of 2 kinds, large violet-purple perfect but sterile ones and small female fertile ones but generally without petals, in small sessile clusters or mixed with the panicles or racemes of the showier ones.............. *L. virginica* 1.

Flowers all alike and perfect in close spikes or heads; corolla whitish or cream color with a purple spot on the standard, not large, barely exceeding the calyx.

Peduncles much shorter than the dense subglobose heads; flowers closely appressed-ascending............... *L. capitata* 2.

Peduncles elongated, equalling the cylindric or subcylindric spikes.

Spikes 1-1.5 cm. thick, short-cylindric................ *L. hirta* 3.

Spikes 5-8 mm. thick, long-cylindric.................. *L. leptostachya* 4.

1. **L. virginica** (L.) Britton. Stem minutely appressed-pubescent or smooth, wand-like, 3-11 dm. tall; leaves crowded on long slender petioles with linear thickish appressed-pubescent leaflets; flowers on short crowded peduncles; calyx 3-5 mm. long, not as long as the strigose pod.—In oak woods of the high dunes. Summer.

2. **L. capitata** Michx. Stems tomentose or rarely smooth, 0.6-1.5 m. tall, rigid; petioles short; leaflets thick, reticulated, silky beneath and sometimes above, oblong; peduncles not as long as the leaves; flower heads globular; pod pubescent, much shorter than the calyx. —Very common in open soil, especially along the dunes. Summer.

Var. **longifolia** (DC.) T. & G. Leaflets lance-oblong to linear, acute, smooth above.—Common with the species.

3. **L. hirta** (L.) Hornem. Pubescence of the stem spreading; petioles about 1 cm. long; pod about 6 mm. long, pubescent, oblong-ovate. —Common in open soil among the dunes. Summer.

4. **L. leptostachya** Engelm. Slender, often branched, appressed-silky-pubescent; leaflets narrowly oblong to linear; spikes slender, loosely flowered; peduncles equalling the leaves; pods densely pubescent, equalling the calyx, ovate.—In dry open soil, prairies of the Calumet District. Summer.

17. VICIA L. Vetch

Herbs with half-arrow-shaped stipules, clinging by the tendrils, which are extensions of the leaf-rachis; flowers or peduncles axillary; calyx 5-cleft, the upper lobes often shorter; wings cohering with the keel; stamens united, one free; pod flat, 2-several-seeded.

Several Old-World species with purple flowers in axillary fascicles (*V. sativa*, *V. angustifolia*) are cultivated in our area and may tend to escape and become naturalized. Our native species are perennials with long peduncles.

Flowers 1-2 cm. long.
  Leaves glabrous.................................... *V. americana* 1.
  Leaves villous..................................... *V. villosa* 2.
Flowers barely 1 cm. long, white, the keel tipped with blue.. *V. caroliniana* 3.

1. **V. americana** Muhl. Smooth; leaflets 10-14, ovate-oblong to elliptical, obtuse, many-veined; peduncles with 6-8 blue or purple flowers.—In moist ground, from Clarke south on the prairies. Early summer.

2. **V. villosa** Roth. (*Winter Vetch.*) Stems villous; leaflets 8-24; flowers large, purple or white, in 1-sided racemes.—Intr. from Eu., and nat. in fields. Summer.

3. **V. caroliniana** Walt. Similar; leaflets 8-24, oblong; flowers scattered.—A dainty little species, found on prairies of the Calumet District and perhaps elsewhere. Spring.

18. LATHYRUS L. Vetchling Pea. Wild Sweet Pea

Perennials; mostly smooth herbs, similar to *Vicia* (see key). The garden sweet pea is *Lathyrus odoratus*.

Stipules broadly ovate and halberd-shaped................ *L. maritimus* 1.
Stipules semi-heart-shaped or semi-arrow-shaped.
  Flowers purplish.................................... *L. palustris* 2.
  Flowers yellowish................................... *L. ochroleucus* 3.

1. **L. maritimus** (L.) Bigel. var. **glaber** (Seringe) Eames. (*Beach Pea.*) Stout, trailing or climbing; leaflets mostly 6-10, thick, almost equalled by the coarsely toothed stipules, ovate-oblong; flowers 6-10, large, purple.—Frequent on the beaches of Lake Michigan. Late summer.

2. **L. palustris** L. Stems winged; leaflets firm; stipules sharp-pointed at both ends. Represented with us by 2 vars.:

Var. **linearifolius** Seringe. 2-7 cm. long; leaflets 2-3 pairs, rarely 4 pairs, linear to lanceolate; peduncles 2-5-flowered; flowers 1.4-1.7 cm. long.—Swamps and wet limy prairies of the Calumet District. Summer.

Var. **myrtifolius** (Muhl.) Gray. Stem 0.3-1 m. long; stipules broadly ovate, half-arrow-shaped; leaflets 2-3 pairs, thin, elliptical, 2-4 cm. long; peduncles 3-9-flowered, flowers 1-1.5 cm. long.—Beaches of Lake Michigan, edges of sloughs, Tamarack to Michigan City, banks of the Calumet River, etc. Summer.

3. **L. ochroleucus** Hook. Stem 3-9 dm. tall, slender; stipules half-heart-shaped, twice as large as the thin, ovate leaflets; flowers 7-10 on the peduncle, 1.5-1.8 cm. long.—In oak forests, on high dunes, etc., not in the Calumet District. Summer.

19. APIOS Ludwig. Groundnut. Wild Bean

Perennials with tuberous rootstocks; calyx somewhat 2-lipped; standard reflexed, very broad, keel scythe-shaped, incurved and at length coiled; stamens united, one free; pod many-seeded, thickish, linear, straight or slightly curved.

1. **A. tuberosa** Moench. Rootstocks swollen with many bead-like tubers; stem slender, climbing over bushes, often to a height of several feet; leaflets 5-7, ovate or ovate-lanceolate; flowers brown-purple, violet-scented, showy. (*Glycine Apios* L.; *A. Apios* MacM.)—On sandy ridges in oak woods and fence rows, throughout. Summer. The stem contains milky juice and the tubers are edible.

20. PHASEOLUS L. Bean

Leaves stipellate; flowers in racemes; calyx with the upper teeth often shorter; stamens united, 1 free; pod scythe-shaped, tipped with the hardened style-base, many-seeded; stigma oblique or lateral.

1. **P. polystachyus** (L.) BSP. (*Wild Bean.*) Perennial, climbing over bushes to the height of 1 m. or more; leaflets broadly ovate or nearly round; flowers bright purple, small; pod 4-5-seeded, drooping. (*P. perennis.*)—In thickets or open ground, Pine; rare, a coastal plain and Mississippi Basin species. Summer.

21. AMPHICARPA Ell. Hog Peanut

Low slender perennials; racemes from upper branches with perfect flowers, the calyx mostly 4-toothed; standard erect, obovate; stamens united, one free; flowers from the base of plant and on slender creeping shoots without petals; from these latter chiefly spring the obovate, fleshy, 1-seeded pods which ripen underground as do peanuts; pods from the upper branches 3-4-seeded, scimitar-shaped, rare.

Leaves thin; bracts small; plant glabrate or pubescent......	*A. monoica* 1.
Leaves firm; bracts large; plant brown-villous.............	*A. Pitcheri* 2.

1. **A. monoica** (L.) Ell. Stem slender, brown-hairy; leaflets thin, stipellate, rhombic-ovate; bracts striate, clasping, persistent; petals purple; seeds large. (*Glycine* L.; *G. comosa* L.; *Falcata comosa* Ktze.)—A curious plant similar to the peanut. Rare, in moist thickets. Summer.

2. **A. Pitcheri** T. & G. Similar, but stouter; leaflets larger; ovary and pods of the petal-bearing flowers pubescent throughout. (*Falcata* Ktze.)—Moist ground, thickets, Tamarack Sta.

22. STROPHOSTYLES Ell. Wild Bean

Stems retrorsely hairy; leaves stipellate; flowers capitate on long axillary peduncles; stamens united, 1 free; pod linear; seeds truncate at the ends, pubescent or mealy. Our species are annuals, the valves of the pod spirally coiling late in the season.

Leaflets mainly lobed; pods nearly glabrous, 5-7.5 cm. long; seeds very pubescent, about 6 cm. long	*S. helvola* 2.
Leaflets unlobed; pods pubescent, 2-3 cm. long; seeds mealy, 3 mm. long or less	*S. pauciflora* 1.

1. **S. pauciflora** (Benth.) Wats. Slender, low-climbing; stem pubescent; leaflets linear to ovate-oblong; flowers purplish, 2-6 on a peduncle; seeds purplish, shining, short-oblong.—Rare, banks of the Grand Calumet. Summer.

2. **S. helvola** (L.) Britton. Stems often long, branched; leaflets ovate to oblong-ovate, the lateral generally with one basal lobe, the terminal with two; flowers greenish white or purplish, not large but conspicuous; pods containing 4-8 brown fuzzy oblong seeds.—On river banks and especially common on the beaches of Lake Michigan where it is quite a characteristic annual. Summer.

FLAX FAMILY (Linaceae)

Our species herbs with regular 4-6-merous flowers; sepals and petals generally 5; stamens 5, joined at the base; pod 8-10-seeded, with twice as many cells as styles.

1. LINUM L. Flax

Leaves simple, entire, without stipules but often with stipular glands; flowers in corymbs or panicles; sepals persistent; petals, stamens, and styles 5, regularly alternate with each other; pod splitting into 5 cells with 2 mucilaginous flattened seeds in each cell.

Petals blue; capsule 10-12 mm. in diameter	*L. usitatissimum* 1.
Petals yellow; capsule 3-6 mm. in diameter.	
Branches grooved	*L. sulcatum* 2.
Branches not grooved, or only obscurely so.	
Branches angled	*L. striatum* 3.
Branches nearly roundish, at least the lower.	
Flowering branches flexible	*L. virginianum* 4.
Flowering branches rigid	*L. medium* 5.

1. **L. usitatissimum** L. (*Common Flax.*) Annual 3-5 dm. tall, branching above; sepals ciliate; flower 1-2 cm. across, the petals widely spreading, sky- or gray-blue.—A cultivated plant, the source of linen and linseed, with pretty flowers; escaped from cult. into waste places of the urban districts, Calumet District. Early summer. Intr. from Eu.

2. **L. sulcatum** Riddell. Annual with linear or subulate leaves and dark glands; flowers small. (*Cathartolinum* Small.)—An inconspicuous wiry plant found on the upper beaches of Lake Michigan. Summer.

3. **L. striatum** Walt. Base of the plant decumbent; flowers crowded on the stiff ascending branches. (*Cathartolinum* Small.)—A wiry plant resembling a *Lechea* in habit. On beaches and in thickets, Dune Park, perhaps elsewhere. Summer.

4. **L. virginianum** L. Stem 3-5 dm. tall; leaves elliptic-lanceolate, generally standing erect, often opposite; flowers scattered, small, closing in the afternoon; capsule depressed-globose. (*Cathartolinum* Small).—An odd graceful plant on the high dunes and in sandy ground throughout. June-August.

5. **L. medium** (Planch.) Britton. Slender, rigid; leaves firm, erect, acute; inner sepals glandular-toothed. (*Cathartolinum* Small.)—Sandy soil, Tremont, acc. to Churchill, and Clarke.

WOOD SORREL FAMILY (Oxalidaceae)

Our species low herbs with sour watery juice and delicate palmately 3-lobed or -divided leaves, the leaflets inversely heart-shaped; flowers regular, 5-merous, the stamens 10-15; ovary 5-celled, the carpels 2-many-ovuled, distinct above.

1. OXALIS L. Wood Sorrel

Sepals 5, persistent; petals 5, sometimes united at the base, soon withering; stamens 10, usually united at the base, alternately shorter; styles 5, distinct; pods prismatic, cylindric or awl-shaped, thin.

Leaves all basal; flowers violet	*O. violacea* 1.
Leaves on the stem; flowers yellow.	
Peduncles 2-flowered, deflexed in fruit, appressed-pubescent	*O. stricta* 2.
Peduncles several-flowered, spreading in fruit, sparsely spreading-pubescent	*O. europaea* 3.

1. **O. violacea** L. (*Violet Wood Sorrel.*) Smooth, from a bulb; scapes 1.2-2.5 dm. tall, umbellate; leaves often appearing and then dying before the flowers bloom. (*Ionoxalis* Small.)—A very pretty species, rare in dune woods near Miller. May, June.

2. **O. stricta** L. (*Common Yellow Sorrel.*) Stems decumbent, usually several, stoutish; pedicels subumbellate at the end of the peduncle; petals pale yellow, often with reddish spot near the base; fruit 1.5-2.5 cm. long, columnar. (*Xanthoxalis* Small.)—Fields and thin woods, frequent. April-October.

3. **O. europaea** Jordan. (*Lady's Sorrel.*) Erect or decumbent, the leaflets often purplish; pedicels cymose. (*O. stricta* of auths., not L.; *O. corniculata* of Gray's Manual, not L.; *O. cymosa* Small, *Xanthoxalis corniculata* Small.)—A common little dooryard weed, fields and roadsides. April-November.

GERANIUM FAMILY (Geraniaceae)

Our species herbs with lobed or divided leaves, with stipules and perfect 5-merous flowers, the sepals persistent, the glands of the disk 5, alternate with the petals; stamens, counting sterile filaments, as many or twice as many as the sepals; ovary deeply lobed; carpels ripening as pods which separate elastically, with their very long styles, from the central axis.

1. GERANIUM L. Cranesbill. Storksbill

Plants with forking stems, the peduncle 1-3-flowered; stamens 10, rarely 5, the alternately longer stamens with glands at their base.

Perennials; petals over 1 cm. long........................ *G. maculatum* 1.
Annuals or biennials, the petals not over 1 cm. long.
  Petals about 1 cm. long, twice the length of the sepals.... *G. Robertianum* 2.
  Petals less than 1 cm. long, 1½ times the length of the sepals.
    Flowers crowded.................................... *G. carolinianum* 3.
    Flowers distant.................................... *G. Bicknellii* 4.

1. **G. maculatum** L. (*Wild Geranium.*) Roots tough; plants erect, hairy; leaves rather large, 5-parted, the divisions variously cut-lobed; petals roundish, blue-purple, bearded on the claw; fruit hairy.—A pretty flower, in rich low woods throughout, also around tamarack bogs. Spring.

2. **G. Robertianum** L. (*Herb Robert.*) Diffuse, aromatic, sparsely hairy annual with 3-divided or pedately 5-divided leaves, the divisions twice-pinnatifid; sepals awned; petals long-clawed, red-purple; fruit wrinkled.—A rare and pretty little species, in rich dune woods acc. to Robinson. Summer and autumn.

3. **G. carolinianum** L. Weedy, diffusely branched, often prostrate, hairy; leaves 5-parted, with divisions cleft into linear segments; flowers cymose; petals white or pale pink.—In waste ground, clearings, roadways, etc. Spring and summer.

4. **G. Bicknellii** Britton. Similar; flowers bright rose color.—Occasional in sandy soil of the Calumet District. Summer.

RUE FAMILY (Rutaceae)

Our species shrubs or small trees with alternate compound leaves which are glandular-dotted, oily-aromatic and acrid and are without stipules; flowers with sexes on different plants, or some of the flowers perfect, all regular; calyx none or if present 4-5-parted; petals 4 or 5; stamens 3-5; pistils 2-5, separate or combined into a compound ovary; fruit a pod or samara.

Leaflets 5-11; cymes axillary; plants spiny................. *Zanthoxylum* 1.
Leaflets 3; cymes terminal; spines none..................... *Ptelea* 2.

1. ZANTHOXYLUM L. Prickly Ash

Flowers small, greenish, the sexes on separate plants; sepals obsolete in our species; pistils 2-5, separate but their styles approximate; fruit a 2-valved shining pod.

1. **Z. americanum** Mill. (*Toothache Tree.*) Much branched shrub 1.5-6 m. tall; bark smooth, gray or brownish; branchlets glabrous and with a pair of straight spines at the base of the leaves; leaflets sessile, opposite, narrowly to broadly ovate, pubescent beneath

and also above when young; petioles and rachis often prickly; flowers appearing before the leaves; fruit a reddish, 1-seeded capsule, globose or ellipsoid with pitted surface, aromatic; seeds shining, black. —Sandy prairies of the Calumet District especially near Wolf Lake, and woods of Dune Creek. Flowers in May; leaves in June; fruit in August. Bark medicinal.

2. PTELEA L. Hop Tree

Shrubs with greenish-white small polygamous flowers in compound cymes; sepals and petals 3-5; ovary 2-celled, with short style and 2 stigmas; fruit a 2-celled, 2-seeded samara, winged all around like that of an elm, but larger and looking like a coin.

1. **P. trifoliata** L. (*Money Tree.*) Shrub 1.5-6 m. tall with smooth gray or grayish-brown bark which on old specimens is rough; branchlets and branches at maturity smooth, light brown or grayish; lateral leaflets sessile, the terminal stalked, ovate to obovate, elliptic, oval or oblong-lanceolate, unequal at base, acute, entire but undulate or coarsely serrate, smooth at maturity, pale beneath, black-dotted; flowers appearing after the leaves, small, with a skunk-like odor; samara 15-30 mm. long, often notched at tip, subcordate at base, resinous-dotted; seed-body at the center of the samara or above it.—Prairies and sandy wastes of the Calumet District and sometimes probably in the true dunes. Flowers in June, fruit in August. Bark when bruised is malodorous.

Var. **mollis** T. & G. Similar but the branches, petioles, and under surfaces of the leaflets permanently velvety; leaflets thick.—Common on the crest of the high dunes.

Var. **Deamiana** Nieuwl. Branchlets densely tomentose; leaves thin, sparingly tomentulose beneath; flowers clove-scented.—On dunes near Michigan City.

P. mesochora Greene var. **mucronata** Nieuwl., a shrub with much contorted glabrous branchlets and glabrate leaves which are glaucous beneath, the samara with a broadly triangular apex and pronounced, curved style-tip or mucro, has been described from Grand Beach, Mich., just outside our limits, and is to be looked for within them. *P. mesochora* may not be sufficiently distinct from *P. trifoliata* to merit specific rank.

FALSE MERMAID FAMILY (Limnanthaceae)

Annual herbs with alternate, petioled, pinnately divided leaves without stipules; flowers perfect, regular, long-peduncled, axillary; sepals 2-5, persistent; petals of the same number as the sepals and alternating with as many glands; stamens twice as many, distinct; carpels as many as the stamens, a single slender style arising from the center of them; fruit deeply lobed, fleshy, not opening, but separating from a short axis.

1. FLOERKEA Willd. False Mermaid

Inconspicuous plants with minute solitary flowers on axillary peduncles; sepals and petals 3, the petals shorter; ovaries 3, united at the base; fruit of 3 roughish achenes.

1. **F. proserpinacoides** Willd. Stems weak, slender, branching; leaves thin, with 3 or 5 narrow segments, sometimes 2-3-lobed; flowers white; fruit nearly globular, smaller than the petals.—A pungent-tasting plant, found in shallow water or mud, or terrestrially on moist ground. Rare in our area; seen in low woods of Dune Creek and to be sought elsewhere. Spring.

MILKWORT FAMILY (Polygalaceae)

Herbs with irregular flowers and more or less united stamens; anthers 1-celled; fruit a 2-celled and 2-seeded pod.

1. POLYGALA L. Milkwort

Low-growing plants with bitter taste, the leaves often dotted, without stipules, simple, entire; flowers irregular, the calyx persistent, consisting of 5 sepals, of which the uppermost and the two lower are small and greenish while the two lateral ones (wings) are larger and colored like the petals; petals 3, connected with each other and with the stamen tube, the middle one keel-shaped and crested on the back; stamens 6 or 8, their filaments united below into a split sheath, or into 2 sets; style prolonged and curved; stigma various; fruit a small 2-seeded pod.

- Keel fringe-crested . . . . *P. paucifolia* 1.
- Keel not fringe-crested.
  - Leaves alternate.
    - Keel conspicuously crested; plants perennial or biennal.
      - Subterranean runners bearing minute flowers; leaves, at least the lower ones, obovate or narrowly wedge-shaped; flowers rose-color . . . . *P. polygama* 3.
      - Subterranean runners and cleistogamous flowers none; leaves lanceolate; flowers white . . . . *P. Senega* 2.
    - Keel minutely crested; plants annual . . . . *P. sanguinea* 4.
  - Leaves, at least the lower, opposite or whorled; plants annual.
    - Leaves all whorled . . . . *P. verticillata* 6.
    - Leaves alternate except the lowest . . . . *P. cruciata* 5.

1. **P. paucifolia** Willd. (*Fringed Polygala.*) 7-10 cm. tall; perennial; lower leaves scale-like, scattered; upper leaves crowded at the summit, ovate and petioled; flowers rose-purple or rarely white, peduncled, 1-3 together; stamens 6.—Rare, rich wooded dunes, Tremont, Dune Park, and formerly at Pine. Early summer.

2. **P. Senega** L. (*Seneca Snakeroot.*) Stems simple, arising in clumps from hard, knotty rootstocks; flowers dull white in a solitary close spike; wings concave.—In sandy soil of the Calumet District, and on the prairies. May-July.

3. **P. polygama** Walt. (*Pink Milkwort.*) Stems numerous from a biennial root, 1.5-2.5 dm. tall, very leafy; raceme loosely many-flowered, the wings longer than the keel; cleistogamous flowers arranged in racemes on short subterranean runners.—A very pretty little plant, locally abundant; characteristic of the dune meadows and the pine woods; northern Calumet District and eastward throughout the dune country. June, July.

4. **P. sanguinea** L. (*Purple Milkwort.*) Stem sparingly branched above, leafy at the top; leaves oblong-linear; heads very dense, white, pink, or bright red purple; wings closely sessile. (*P. viridescens* L.)—A wand-like little plant, characteristic of the dune meadows, northern Calumet District and eastward throughout the dune country. June-September.

5. **P. cruciata** L. Stems 1-2.6 dm. tall, almost winged at the angles, branches opposite; leaves mostly in fours, linear-spatulate; spike sessile, short and thick; flowers rose or greenish purple, the wings slightly heart-shaped, tapering to a sharp point; crest small; bracts persisting after the fall of the flowers.—An unusual little plant by reason of the large bracts around the flowers; characteristic of dune meadows, northern Calumet District eastward through the dune country. July-September.

6. **P. verticillata** L. Slender, 8-25 cm. tall, much branched; stem leaves all whorled, those on the branches alternate; spikes slender, peduncled, short and dense; bracts falling with the flowers; flowers small, greenish white tinged with purple; wings clawed; keel strongly crested.—A curious little plant, characteristic of dune meadows and sandy prairies, northern Calumet District and eastward through the dune country. June-November.

JEWEL-WEED FAMILY (Impatientaceae)

Our species glaucous, succulent herbs with watery juice and simple leaves without stipules; flowers irregular; calyx spurred, petal-like; stamens 5, with short, thick filaments; ovary 5-celled.

1. IMPATIENS L. Jewel-weed

Leaves in ours oval or ovate, coarsely toothed and petioled; flowers axillary or panicled; large flowers generally sterile; small flowers fertilized in bud, the petals dropping before they expand; sepals apparently 4, the spur-like petaloid sac being really a fifth sepal; petals 2, 2-lobed; filaments scaly-appendaged, the 5 scales converging over the stigma; fruit a pod with a thick axis, bearing the seeds, the 5 opening valves elastically coiled so that when jarred, the coils spring, and hurl the seeds.

Flowers orange-color, thickly spotted; sac longer than broad. *I. biflora* 1.
Flowers pale yellow, sparingly spotted; sac broader than long.. *I. pallida* 2.

1. I. biflora Walt. (*Spotted Touch-me-not.*) Stems translucent; spots reddish brown.—Common in low wet woods, around marshes and bogs. Summer.

2. **I. pallida** Nutt. (*Yellow Touch-me-not.*) Stems as above; spots brownish.—Habitats of the preceding, less common. Summer.

SPURGE FAMILY (Euphorbiaceae)

Our species herbs, often with milky juice; the sexes in different flowers or different plants, sometimes falsely appearing to be all in one flower when inclosed within petal-like bracts or involucral glands; ovary free and generally 3-celled; fruit commonly a 3-lobed capsule, the lobes or carpels separating elastically from the central axis.

Flowers with calyx but without an involucre.	
Flowers in terminal racemes or spikes; plants stellate-downy or scurfy; leaves mostly entire....................	*Croton* 1.
Flowers in axillary spikes or racemes; pubescence in our species not stellate-downy or scurfy; leaves toothed.	*Acalypha* 2.
Flowers all without calyx, but included in a cup-shaped calyx-like or petal-like involucre, the whole appearing like a single hermaphrodite flower.......................	*Euphorbia* 3.

1. CROTON L. Hogwort

Our species glandular, annual, strong-scented plants with alternate or subopposite leaves; sexes in different flowers on the same plant, the male with generally 5-parted calyx; petals alternating with glands; stamens 5 or more; female flowers usually at the base of the male spike or cluster, with 5-10-cleft calyx; ovary 2-4-celled; styles as many, cleft.

1. **C. capitatus** Michx. 2-5 or more dm. tall, branched; leaves elongate-oblong, long-petioled; stamens 10-14; 5 glands alternating with the much fringed petals in the male flowers, none in the clustered female flowers which have a 7-12-parted calyx; styles 2-3, twice-cleft. —Adv. from the South on railroad ballast. Summer.

2. **C. glandulosus** L. var. **septentrionalis** Muell. Arg. 3-7 dm. tall; leaves obtusely toothed, oblong or narrower with 2 saucer-shaped glands at the base; male flowers with 4-parted calyx, 4 petals and 8 stamens; female flowers with 5-parted calyx and 3 styles, each 2-cleft. —Sand flats near Lake Michigan in the Calumet District.

2. ACALYPHA L. Three-seeded Mercury

Our species annuals with alternate, petiolate leaves with stipules; clusters of male flowers minutely bracted; female flowers surrounded by a large, leaf-like, cut-lobed, persistent bract; male flowers small, without corolla, the calyx 4-parted; stamens 8-16, united at base; calyx of female flowers 3-5-parted; styles 3, the stigmas red, fringed.

1. **A. virginica** L. Stem 3-6 dm. tall, often purplish; leaves sparsely and obtusely serrate, long-petioled, ovate or oblong-ovate; male spikes shorter than the large, palmately 5-9-cleft fruiting bracts; fruit and seeds nearly smooth.—In fields and open soil of the Calumet District. Summer.

3. EUPHORBIA L. Spurge

Our species herbs, generally with a milky juice; flowers included in a 4-5-lobed, cup-shaped involucre resembling a calyx or corolla and usually bearing thick glands, often with petal-like margins. The numerous male flowers line the base of the involucre and consist of single stamens; female flowers consisting of a 3-lobed, 3-celled ovary with no calyx, generally stalked and protruding from the center of the involucre; the whole resembling bisexual flowers; styles 3, each 2-cleft.

- Stem prostrate or barely ascending.
  - Plants glabrous.
    - Leaves entire, cordate at base; seeds smooth.......... *E. polygonifolia* 1.
    - Leaves serrulate at base and very unequal-sided and curved; seeds rough........................ *E. glyptosperma* 2.
  - Plants pubescent.
    - Leaves oblong-linear; seeds sharply angled; peduncles as long as the petioles, in leafy clusters .... *E. maculata* 4.
    - Leaves elliptic or obovate; seeds obtusely angled; peduncles shorter than the petioles, in almost naked clusters.................................... *E. humistrata* 5.
- Stem erect, sometimes oblique.
  - Leaves opposite; bracts not showy.
    - Plants hairy; leaves whitish near the base............. *E. dentata* 8.
    - Plants smooth; leaves red-spotted near the center...... *E. Preslii* 3.
  - Leaves mostly alternate or whorled; bracts showy.
    - Glands of the involucre without petal-like appendages; leaves of the inflorescence heart-shaped......... *E. Cyparissias* 6.
    - Glands of the involucre petal-like, appendaged; leaves of the inflorescence long and narrow............ *E. corollata* 7.

1. **E. polygonifolia** L. (*Seaside Spurge.*) Prostrate, much branched; leaves oblong-linear, obtuse, mucronate, opposite on short petioles; peduncles in the forks of the stems; pods 2-3 mm. long. (*Chamaesyce* Small.)—A curious little matted plant of the wave-swept beaches, common. Milky juice and involucral glands none. Summer.

2. **E. glyptosperma** Engelm. Spreading or half-erect; leaves linear-oblong, often red-spotted; peduncles as long as the petioles; clusters lateral, leafy; glands of the involucre with crenulate appendages; pod and seed sharply 4-angled, the latter transversely wrinkled. (*Chamaesyce* Small.)—In dry soil and waste ground, occasional. Summer.

3. **E. Preslii** Guss. Erect or obliquely ascending; glabrous throughout; leaves ovate-oblong or oblong-linear, oblique, sometimes curved, serrate, with a red spot or red margins; peduncles in loose, leafy terminal cymes; appendages of the involucre entire, larger and white, or smaller and red; seeds obliquely angled, wrinkled. (*Chamaesyce* Arthur.)—In waste ground and along railroads, etc; appearing as if introduced, but probably also native. Summer.

4. **E. maculata** L. (*Milk Purslane.*) Prostrate; leaves opposite, oblong-linear, with a brown-red blot in the center; glands of the involucre small, with red appendages; seeds red, 4 mm. long. (*Chamaesyce* Small.)—Common, especially in the Calumet District, in waste ground. Summer.

5. **E. humistrata** Engelm. Similar to the preceding; leaves not always red-blotched; stems procumbent; involucre cleft on the back, its red or white appendages crenate or truncate; seeds 1 mm. long. (*Chamaesyce* Small.)—In rich moist soil, frequent throughout. A common lawn weed. Summer.

6. E. Cyparissias L. (*Cypress Spurge.*) Perennial by horizontal rootstocks, bright green and glabrous; stems clustered, often forming large patches, scaly below, leafy above, 2 dm. tall; leaves linear or almost filiform, those subtending the umbels whorled, the others alternate; floral leaves appearing like yellowish petals; glands 4, horn-shaped; capsule subglobose. (*Tithymalus* Hill.)—An odd little plant with abundant milky juice; planted around graveyards on account of its resemblance to a little cypress; intr. from Eu. Poisonous. In our area it is rare, a patch being present on Mt. Tom. Summer.

7. **E. corollata** L. (*Flowering Spurge.*) Perennial by a long stout rootstock, bright green, umbellately branched above; leaves entire, linear or oblong, those under the umbels whorled; bracts green; involucres bearing 5, rarely 4, yellowish green, oblong glands, with round, white, petal-like appendages. (*Tithymalopsis* Kl. & Garcke; *Agaloma* Raf.)—Because of its abundant milky juice, this conspicuous plant is often called "milkweed." Poisonous. Most variable in the number of rays of the umbel, in stature and shape of leaves. Probably the commonest herbaceous plant of the high dunes, and everywhere abundant except on the prairies. Summer.

8. **E. dentata** Michx. Erect or ascending, hairy annual; leaves petioled, all except the lowest opposite, variable in shape, ovate-lanceolate or linear, coarsely toothed; involucre with 5 incised lobes and 1 or more sessile glands. (*Poinsettia* Kl. & Garcke.)—Waste ground and along railroad tracks; not certainly native. Summer.

WATER STARWORT FAMILY (Callitrichaceae)

Herbaceous, chiefly aquatic plants with slender stems and opposite entire leaves without stipules and minute axillary flowers without a perianth; stamen 1; pistil 1; styles 2, slender, minutely pimply-roughened; fruit compressed, lobed, winged on the margins, separating into 4 flat carpels.

1. CALLITRICHE L. Water Starwort

Characters of the family.

Bracts present.	
Fruit flat on the face, oval, longer than the styles........	*C. palustris* 2.
Fruit plano-convex, obovate, shorter than the styles......	*C. heterophylla* 3.
Bracts none..	*C. autumnalis* 1.

1. **C. autumnalis** L. Submersed perennial with numerous linear, 1-nerved, notched leaves; stems 7-15 cm. long; fruit 2 mm. broad or more, circular, notched, broadly winged and deeply grooved. (*C. bifida* Morong.)—Rare; found in a cat-tail swamp near Griffith and may be looked for elsewhere. July-September.

2. C. **palustris** L. Amphibious; submerged leaves linear, 1-nerved; floating or emersed leaves crowded into a tuft, obovate, 3-nerved, narrowed to a margined petiole, dotted with stellate scales; in strictly aquatic plants all leaves linear as in the preceding; fruit 2-bracted, the 2 carpels separated by a deep grove. (*C. verna* L.)—Rare, acc. to Pepoon, in the Calumet River from Clarke to Hammond, and on its shores. Summer.

3. C. **heterophylla** Pursh. Similar to the preceding, but the floating or emersed leaves abruptly narrowed into a long petiole, and the fruit smaller, as broad as high, or broader, the groove between the carpels narrow and shallow.—Very rare, acc. to Pepoon, in the Calumet River, near Gary. Summer.

SUMAC FAMILY (Anacardiaceae)

Trees or shrubs with alternate leaves (compound in our species), without stipules; flowers small, regular, 5-merous; ovary 1-celled; stigmas and styles 3.

1. RHUS L. Sumac. Poison Ivy

Wood corky; flowers greenish, polygamous; calyx persistent; pistil 1; fruit a small, 1-seeded drupe.

A genus sometimes divided into 4 or 5 genera, but the groups of species separated more by their relation to man than by natural limits. The species poisonous to touch are known by their usually smooth fruits of the waxy white color of mistletoe berries.

Fruit covered with acid crimson hairs; plants resinous-aromatic or with milky juice; inflorescence terminal.	
Flowers appearing after the leaves in a terminal panicle; leaves odd-pinnate; juice milky. Sect. *Sumac.*	
Branches and stalks smooth; leaves white-glaucous beneath	*R. glabra* 3.
Branches and stalks downy or velvety.	
Petioles wing-margined	*R. copallina* 2.
Petioles not winged	*R. typhina* 1.
Flowers in small solitary or clustered heads or spikes, appearing before the leaves; leaves 3-foliate, resinous-aromatic, without milky juice. Sect. *Lobadium.*	*R. aromatica* 4.
Fruit usually smooth (rarely pubescent), waxy white; plants without milky juice and not aromatic, but with a watery acrid juice poisonous to the skin; flowers in loose and slender axillary panicles. Sect. *Venenatae.*	
Leaves pinnately 7-13-foliate	*R. Vernix* 5.
Leaves 3-foliate	*R. Toxicodendron* 6.

1. R. **typhina** L. (*Staghorn Sumac.*) Shrub or tree, the tallest of our species, with orange-colored wood; branches and stalks densely velvety-hairy; leaflets 11-31, pale beneath, serrate, pointed, oblong-lanceolate. (*Datisca hirta* L.; *Rhus hirta* Sudw.)—Sand ridges and dunes, occasional, also on prairies in thickets. The bark and leaves of

this species, as of the two following, have long been used for dyes, inks, and tannins, hence the names shoe-make, shumac, and sumac. The berries are edible, and may be made into an acid beverage resembling lemonade.

2. **R. copallina** L. (*Sumac.*) Low shrub with downy stalks and branches; leaflets 9-21, often entire, oblique or unequal at base, oblong, acute but not long-pointed, upper surfaces shining.—On oak-wooded dunes, occasional. Summer.

3. **R. glabra** L. (*Sumac.*) Shrub 0.6-5 m. tall; leaflets 11-31, similar to those of *R. typhina.*—A variable species, divided by Dr. Greene into many doubtful species; common on dry soil, dunes, and ridges throughout.

4. **R. aromatica** Ait. (*Sweet Sumac.*) Low shrub with rhombic-obovate, unequally cut-toothed leaflets, the terminal one sometimes 3-cleft and cuneate at base, pubescent when young, sometimes glabrous when old. (*R. canadensis* Marsh., not Mill.)—A common and characteristic, rather handsome plant of the high dunes and low sand ridges, common except on prairies. The crushed leaves are fragrant, somewhat like sweet-fern. Summer. Our specimens have the puberulent branches and hirsute fruit of the plant described as an endemic but scarcely valid species of our region under the name of *Schmaltzia arenaria* Greene.

5. **R. Vernix** L. (*Poison Sumac, Poison Elder, Poison Ash, Poison Dogwood.*) Straggling shrub, 2-5 m. tall, with soft yellowish-brown wood, the branchlets smooth or nearly so; leaflets entire, obovate-oblong, short-stalked, thickish, 7-11. (*Toxicodendron* Kuntze; *R. venenata* DC.)—Frequent in bogs, and around sloughs. Summer. The most poisonous of all species.

6. **R. Toxicodendron** L. (*Poison Ivy.*) A low shrub with extensive roots, sending up erect shoots, or a climbing vine with innumerable rootlets clasping the support; leaves long-stalked, the leaflets variously petiolulate or nearly sessile, large and plane or small and crinkled, entire or variously toothed or lobed, variously pubescent. (*R. radicans* L., *Toxicodendron vulgare* and *T. pubescens* Mill.)—Common throughout.

A most variable species, which has been separated into species in many ways, but quite without constantly linked characters worthy of specific distinction. In the dunes the plant is a low shrub never twining or climbing even when support is offered, but running under ground; in thickets of the prairie region it climbs as a vine (forma *radicans* [L.] McNair). To many persons the oily principle in every part of the plant is poisonous at all times of the year; in case this or the preceding species is touched the hands should be washed immediately, and if possible a solution of iron chloride applied. But if blisters once develop the affected parts should not be bathed as this spreads the poison, and drying agents should be applied under the supervision of a physician. (This statement regarding the spread of the poison does not coincide with McNair's observation: see J. B. McNair, Poison Ivy, Botanical Leaflet No. 12, Field Museum.—ED.)

HOLLY FAMILY (Ilicaceae)

Trees or shrubs with watery sap and alternate petioled simple leaves and small clusters of white regular axillary flowers, the sexes wholly or in part on different plants; calyx 3-6-parted; corolla of 4-6 petals; stamens generally as many as the petals; ovary 1, free from the calyx; fruit a small, berry-like drupe enclosing several nutlets. (*Aquifoliaceae.*)

Petals linear, free from each other and from stamens	*Nemopanthus* 1.
Petals or corolla-lobes oval or obovate; stamens adnate to the base of the corolla	*Ilex* 2.

1. NEMOPANTHUS Raf. Mountain Holly

Branching shrubs with ashy bark and deciduous smooth leaves on slender petioles; flowers on long slender axillary peduncles, clustered or solitary; calyx of the male flower of 4-5 minute deciduous teeth and quite obsolete in the female flowers; petals 4-5, spreading; stamens of the same number; drupe containing 4-5 bony nutlets.

1. **N. mucronata** (L.) Trel. Stems up to 3 m. tall; leaves thin, elliptic-oblong, almost or quite entire, paler beneath; drupe bright red, 4-5-lobed. (*Ilicoides* Britton.)—A common shrub of dune crests. Spring.

2. ILEX L. Holly

Trees or shrubs of various habit; in the Christmas holly the leaves are evergreen and spiny but in our species they are thin, deciduous and merely serrate; male flowers clustered in the axils, the parts 4, 5 or 6; female flowers solitary, the parts 6, rarely 5, 7 or 8; fruit a berry-like drupe containing 4-6 little nutlets.

1. **I. verticillata** (L.) Gray. (*Winterberry, Black-alder.*) Shrub 2-8 m. tall with glabrous or slightly pubescent twigs and oval, obovate or wedge-lanceolate, acute leaves, the margins serrate, the pubescence various but typically confined to the downy veins beneath; flowers short-stalked; fruit small but bright red or rarely white and clustered so as to appear whorled around the twig.—Frequent in bogs, around acid swamps, etc. Summer. A variable plant as to its leaves; the following varieties are found in our area:

Var. **padifolia** T. & G. Leaves 5-12 cm. long, the under surface covered with tomentum.

Var. **tenuifolia** (Torr.) Wats. Leaves thin, smoother, under a lens seen to be sprinkled with translucent dots; female flowers generally solitary.

BITTERSWEET FAMILY (Celastraceae)

Shrubs or vines with simple leaves and small regular flowers; petals 4-5, accompanied by as many sepals and stamens and all inserted on a disk which fills the bottom of the calyx and sometimes covers the ovary; fruit in our species a somewhat fleshy 2-5-celled pod, often resembling a berry; seeds with bright-colored arils; pedicels jointed.

Leaves opposite; flowers in axillary cymes or solitary.......	*Evonymus* 1.
Leaves alternate; flowers in terminal racemes..............	*Celastrus* 2.

1. EVONYMUS L. Spindle Tree

Shrubs with 4-sided light-green limber branchlets and opposite serrate leaves and loose pedunculate cymes of small axillary perfect flowers; sepals 4 or 5, united at base, forming a short and flat calyx; petals 4-5, rounded, spreading; stamens short; pod 3-5-lobed and valved; seeds 1-4, each enclosed in a red aril.

Erect shrub; petioles long; leaves acute; flowers dark purple; pods smooth....................................	*E. atropurpureus* 1.
Trailing shrub; petioles very short; leaves obtuse; flowers greenish pink; pods rough.........................	*E. obovatus* 2.

1. **E. atropurpureus** Jacq. (*Burning-bush, Wahoo.*) Stems 2-4 m. tall; leaves oval-oblong; petals 4.—Thickets, Clarke and perhaps elsewhere, not common. June.

2. **E. obovatus** Nutt. (*Running Strawberry-bush.*) Branches rooting; stem reclining; flowering branches erect, slightly 4-winged; leaves oblong or obovate, dull and thin; petals 5.—Occasional in thickets near Mineral Springs and perhaps elsewhere, forming ground-covers. Spring. In autumn the red fruits are ornamental.

2. CELASTRUS L. Bittersweet

Our species trailing or twining vines with small greenish flowers in racemes terminating the roundish branches; sexes wholly or in part on separate plants; petals wavy-toothed, 5, inserted on the margin of the cup-shaped disk with the 5 stamens; pod globose, berry-like, 3-celled and -valved, orange-colored; seeds 1 or 2 in each cell; aril scarlet, pulpy.

1. **C. scandens** L. (*Climbing Waxwork.*) Stems often very long; leaves pointed, finely serrate, ovate-oblong or lanceolate.—Climbing trees or, lacking support, as on dune crests, trailing on the ground and acting as a sandbinder. One of the characteristic plants of the high dunes, ornamental in autumn. The leaves tend to fold lengthwise along the midrib, perhaps in reaction to the exposure upon open dunes. Early summer.

SANDALWOOD FAMILY (Santalaceae)

Our species herbs with entire leaves; calyx 5-cleft, its tube coherent with the ovary; stamens 5, opposite the calyx lobes, inserted on the edge of a fleshy disk; style 1; fruit not opening, 1-seeded, drupe-like or nut-like.

1. COMANDRA Nutt. Bastard Toad-flax

Smooth, sometimes parasitic perennials with soft stems from a somewhat woody base; leaves alternate, nearly sessile; flowers perfect, the calyx urn-shaped, lined above the ovary with the adherent disk which has a 5-lobed free border; petals none; anthers connected by tufts of hairs with the persistent calyx which crowns the fruit.

1. **C. umbellata** (L.) Nutt. Rootstock underground; flowering stems 1.5-4 dm. tall, very leafy, branching; leaves thin, pale beneath with prominent midrib; inflorescence consisting of many little cymes of small flowers disposed in a panicle with spreading branches; fruit globular urn-shaped.—Frequent in sandy fields and wooded dunes west of Michigan City and north of Mineral Springs, also in sandy fields of Lake Co. Probably parasitic on the roots of shrubs (especially blueberries) the first year, but by the second year living as an independent plant. May-August.

This little plant, so inconspicuous and ephemeral, deserves further study. There has been described another species to which it is sometimes asserted all the material from our area should be referred. This is *C. Richardsiana* Fernald, said to differ in having a superficial rootstock, and firm green leaves not paler beneath, with obscure veins, and few-flowered corymbs on ascending branches. These differences have been difficult to make out in the living plants from our area.

MAPLE FAMILY (Aceraceae)

Trees or shrubs with watery saccharine sap and opposite simple and palmately lobed leaves or somewhat pinnately divided foliage; flowers small, frequently without petals, the sexes wholly or in part on different plants.

1. ACER L. Maple

Calyx colored, 5 (rarely 4-12-) -lobed; petals none or as many as the sepals, short-clawed; stamens 3-12; ovary 2-celled; styles 2, long and slender; fruit a samara, that is, winged fruit; samaras 2, appearing as one fruit with two wings, but these ultimately separable.

Often valuable timber trees, generally with brilliant autumnal foliage; some cultivated in our region, especially foreign species.

Leaves simple, palmately lobed.	
Sinuses of the leaf-lobes rounded	*A. saccharum* 1.
Sinuses of the lobes acute.	
Leaves silvery-white beneath	*A. saccharinum* 2.
Leaves pale but not silvery below	*A. rubrum* 3.
Leaves pinnate	*A. Negundo* 4.

1. **A. saccharum** Marsh. (*Sugar Maple.*) Tall tree with dark smooth bark in long plates; leaves 3-5-lobed, sparingly sinuate-toothed, heart-shaped or more commonly truncate at base, whitish below and

smooth or downy on the veins; flowers in nearly sessile terminal or lateral corymbs, greenish yellow, appearing with the leaves, drooping on very slender hairy pedicels; petals none; wings of the fruit diverging, broad.—A fine tree, yielding maple sugar; occasional in dune forests. Spring.

2. A. saccharinum L. (*Silver Maple.*) Tall tree with light flaky bark, the lower branches often sweeping low; leaves deeply and acutely 5-lobed with many sharp teeth, the base heart-shaped; flowers in umbel-like clusters arising from separate lateral buds and appearing long before the leaves; stamens 3-6; petals none; fruit with large divergent wings, woolly when young.—A handsome tree, often of pagoda-like shape. In low rich woods and pastures. Spring.

3. **A. rubrum** L. (*Red* or *Swamp Maple.*) Medium or tall tree with smoothish bark and red twigs; leaves 3-5-lobed, the divisions generally less deep than in the preceding, the serrations fine but not so deep; flowers scarlet or yellowish; petals present; pedicels short; fruit smooth, on long drooping pedicels.—A common tree especially of bogs and low woods among the dunes. The leaves are variable in outline, pubescence, and the color of their spring and autumn states. Flowers appearing in the earliest spring, sometimes in late winter, long before the leaves.

4. **A. Negundo** L. (*Box Elder.*) Small tree with light-green twigs and smooth bark; leaflets 3-5 (rarely 9), very veiny, toothed, pointed, ultimately smoothish; petals none; fruit smooth, the wings incurved, large. (*Negundo* Karst., *Rulac* Hitchc.)—A round-headed tree, quite distinct from other maples by its pinnate leaves which do not generally have bright autumn colors. The wood is worthless. Along streams and in low meadows. Late spring.

BUCKTHORN FAMILY (Rhamnaceae)

Trees or shrubs with simple, chiefly alternate leaves, these frequently 3-nerved, and small or no stipules; flowers small, regular, sometimes without petals, the parts in 4's or 5's, the stamens opposite the petals and like them inserted on the edge of the fleshy disk which fills the bottom of the short calyx tube; ovary 1, sometimes adherent to the disk and tube; stigmas 2-5; fruit a drupe or pod with one seed, without aril.

Leaves with three principal nerves; flowers perfect, white; fruit a 3-lobed dry pod .... *Ceanothus* 1.

Leaves with one principal nerve; flowers with the sexes separated, greenish; fruit a fleshy drupe .... *Rhamnus* 2.

1. CEANOTHUS L. Red-root

Shrubs with red roots, and flowers in little umbel-like clusters forming dense panicles or corymbs at the summit of naked branches; calyx and pedicels colored like the petals; calyx 5-lobed, the lower part adhering to the disk and the ovary, the upper part separating across the fruit; petals hooded, on slender claws, white.

Leaves ovate, acute, pubescent; common peduncles long....	*C. americanus* 1.
Leaves elliptic-lanceolate, blunt, glabrous; common peduncles short..	*C. ovatus* 2.

1. **C. americanus** L. (*New Jersey Tea.*) Stems branching, commonly several together from the dark reddish root; leaves oblong-ovate, serrate, truncate or slightly heart-shaped at the base; branches downy.—A common shrub of dunes throughout. The leaves were used for tea during the American Revolution. Early summer.

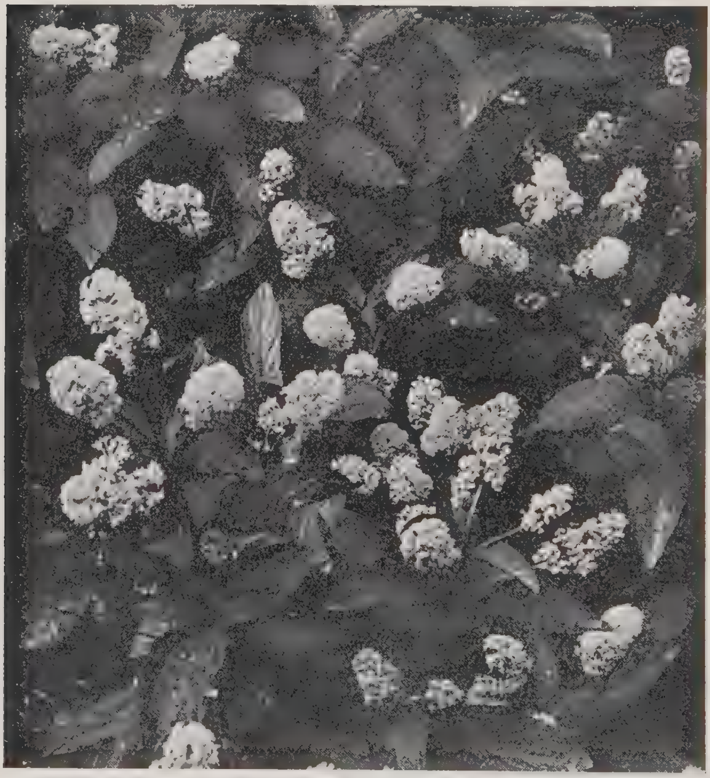


FIG. 22. NEW JERSEY TEA (*Ceanothus americanus*)

2. C. ovatus Desf. Low shrub with narrower leaves, finely glandular-serrate; branches smooth.— Frequently reported from our area but apparently rare. Habitat as in the preceding species.

2. RHAMNUS L. Buckthorn

Shrubs or small trees with flowers in axillary clusters, the sexes in our species on different plants and the petals none; calyx 5-cleft, the tube bell-shaped and the stamens 5 in our species; ovary free; drupe berry-like, containing 2-4 separate-seeded nutlets of bony texture.

1. **R. alnifolia** L'Hér. A low shrub with puberulent thornless branches and oval to elliptic acute serrate leaves; flowers solitary or 2-3 together; fruit black, 3-seeded.—In tamarack bog at Mineral Springs, Pine, Whiting. A northern species reaching a southern limit here. Early summer. The fruit is not edible.

GRAPE FAMILY (Vitaceae)

Woody vines with watery juice, usually climbing by tendrils; flowers small, regular, usually polygamous; calyx small, truncate, without lobes; stamens as many as petals and opposite them; berry 2-celled, usually 4-seeded; petals 4-5; style short or none.

Leaves digitately divided; corolla expanding; tendril-bearing branches often with adhesive disks; ovary without disk..	*Psedera* 1.
Leaves simple, though often lobed; corolla falling without expanding; tendrils coiling, not provided with adhesive disks; ovary surrounded by a nectariferous disk......	*Vitis* 2.

1. PSEDERA Neck. Woodbine

Leaflets 3-7, oblong-lanceolate, coarsely serrate; flower clusters cymosely compound, greenish white; tendrils, pedicels and peduncles bright red; fruit 1-4-seeded, with thin, inedible flesh.

Leaflets dull green above, paler beneath; tendrils with 5-12 long branches ending in adhesive disks; peduncles 1-4 cm. long; inflorescence paniculate; main branches unequal; fruit subglobose, scarcely fleshy........................	*P. quinquefolia* 1.
Leaflets shining above, scarcely pale beneath; tendrils with 2-5 branches, these rarely ending in adhesive disks; peduncles 4-8 cm. long; inflorescence regularly and equally dichotomous; fruit somewhat obovoid, more fleshy than the preceding........................	*P. vitacea* 2.

1. **P. quinquefolia** (L.) Greene. (*Virginia Creeper.*) Glabrous even on the young shoots; fruits blue, 6-7 mm. in diameter. (*Ampelopsis* Michx.; *Parthenocissus* Planch.)—High-climbing in trees and shrubs and along fences throughout. Leaves in autumn brilliant crimson.

Var. **hirsuta** (Don) Rehder, has pubescent rootlets, tendrils and branchlets, at least when young. It occurs with the type.

2. **P. vitacea** (Knerr) Greene. High-climbing over shrubs and trees, and along fences; leaflets shining above, scarcely paler beneath; tendrils with 2-5 branches; peduncles 4-8 cm. long; inflorescence regularly dichotomous; fruit somewhat ovoid, 6-10 mm. in diameter, slightly fleshy, dark blue. (*Parthenocissus* Hitchc.)—In moist woods and alluvial thickets acc. to Deam, and as a sand binder on crests of dunes, also along the wire of fences.

2. VITIS L. Grape

Flowers greenish-white, very fragrant, in a compound thyrse, the pedicels mostly umbellate-clustered; leaves heart-shaped; some of the plants with perfect flowers, others staminate or pistillate strictly; the petals are so early deciduous and the calyx so small that the flower appears to consist only of the stamens or the ovary and its disk, or both; seeds pear-shaped, with a beak-like base.

Lower surface of the leaves at maturity velvety-tomentose or covered with a loose wool.	
A tendril or inflorescence opposite each of several successive leaves; berries 14-18 mm. in diameter........	*V. labrusca* 1.
Tendrils intermittent; berries 12 mm. or less in diameter..	*V. aestivalis* 2.
Lower surface of the leaves at maturity glabrous or merely pubescent along the axils and the veins.	
Leaves very glaucous or even whitened-silvery beneath...	*V. aestivalis* var. 2.
Leaves merely paler beneath.	
Teeth of the leaves narrowly deltoid or even lanceolate-falcate; berries blue, with a bloom..............	*V. vulpina* 3.
Teeth of the leaves broadly deltoid, cuspidate; berries purple or black, without a bloom...............	*V. cordifolia* 4.

1. **V. labrusca** L. (*Fox Grape.*) Long vine, more trailing than climbing; branchlets and petioles covered with a rusty or whitish tomentum, and often more or less with stiff stalked glands; leaves as broad as or broader than long, generally with two short lateral lobes, woolly above when unfolding, becoming smooth or nearly so, appearing wrinkled, dull dark green, the under surface permanently rusty-woolly, irregularly small-toothed; berries dark purple or wine red, with little or no bloom, 15 mm. long.—Common on crests of high dunes, and elsewhere. Berries sweet; this species has given rise to most of the cultivated American grapes, including the Concord and the Catawba. Flowers in June. Berries in August and September.

2. **V. aestivalis** Michx. (*Summer Grape.*) High-climbing vine; branchlets woolly when young, becoming smooth, except first internodes; leaves about as long as broad, 3-5-lobed or entire, at first cobwebby-pubescent on both sides, remaining so below, becoming smooth and bright green above; fruit black, with a bloom, 7-11 mm. thick.—Fruit pleasant. On sandy ridges of the Calumet District and eastward through the dune country. Flowers in June; fruit in October.

Var. argentifolia Munson. (*Silver Grape.*) Under surface of the leaves almost from the first smooth and silver-glaucous; peduncles generally longer. (*V. bicolor* LeConte.)—Frequent in the range of the type.

3. **V. vulpina** L. (*River-bank Grape.*) Large, high-climbing vine with shreddy bark; branchlets finally smooth; leaves about as broad as long, often 3-lobed, smooth above at maturity but beneath somewhat white-hairy on the principal veins, teeth few, large; berries black, with a dense bloom, 9-12 mm. thick.—In woods, and climbing over trees and shrubs in the tamarack bogs, in the high dune country. Flowers in May and June, fruit in August, acid.

Var. **syrticola** Fernald & Wiegand. Dwarfed, mostly prostrate; stems sharply zigzag; leaves wider; hairs colorless, not white; branchlets pubescent until maturity.—On the crests of high dunes.

4. **V. cordifolia** Michx. (*Frost Grape.*) Large, high-climbing vine; branchlets ultimately smooth except the nodes; leaves cordate-ovate in outline, acute at the tip, occasionally with two short lateral lobes or mere shoulders, smooth above, hoary or rusty-pubescent beneath on veins and in axils, regularly and deeply toothed; berries black, without a bloom, 8-10 mm. thick.—Dune tops, and sandy ridges of the northern Calumet District. Flowers in May; fruits in October.

LINDEN FAMILY (Tiliaceae)

Trees or shrubs with alternate simple leaves and small deciduous stipules and generally cymose flowers; sepals and petals 5; stamens numerous, cohering in groups of 5 or 10; ovary 1; style simple; fruit a drupe.

1. TILIA L. Linden

Trees with heart-shaped unequal-sided leaves and axillary or terminal, white or yellowish, perfect flowers, the peduncles subtended by and partly adnate to bracts which persist in fruit and act as wings; fruit dry, drupe-like, globose, 1-2-seeded.

1. **T. americana** L. (*Basswood.*) Tall tree, or on the crests of dunes, where it is common, reduced to a stunted shrub; leaves large, green and glabrous or practically so; flowers honey-scented, showy, cream-color; bract tapering or stalked at the base; fruit obscurely ribbed, ovoid.—A common shrub of dune crests, and more rarely a tall tree of the rich low dune woods. July. The timber is valuable.

MALLOW FAMILY (Malvaceae)

Herbs (in our species; shrubs in many cultivated plants) with alternate, stipulate leaves and regular flowers, the stamens characteristically united into a column arising from the center of the flower and adhering to the base of the short claws of the petals; sepals persistent; pistils several, the ovaries united in a ring or forming a several-celled pod.

In our species the flower stalks are jointed and axillary and the plants are pervaded by more or less mucilaginous juice and frequently covered with stellate pubescence or down; the leaves are palmately lobed in the hollyhock (*Althaea rosea*), which, like the rose-of-sharon (*Hibiscus syriacus*), is cultivated in our area and tends to escape.

Calyx without an involucel..............................	*Abutilon* 1.
Calyx subtended by an involucel.	
Involucel of 3 bractlets..............................	*Malva* 2.
Involucel of many bractlets..........................	*Hibiscus* 3.

1. ABUTILON Mill. Velvet Leaf

Ours annuals with heart-shaped, angular or lobed leaves and axillary flowers; staminal column anther-bearing at the apex; carpels falling away from the central axis at maturity, 2-8-seeded, at length 2-valved.

1. **A. Theophrasti** Medic. 6-12 dm. tall; leaves velvety-pubescent; flowers yellow; carpels 12-15, beaked, hairy.—Around cities, in waste places. Nat. from India.

2. MALVA L. Mallow

Leaves in our species with 5-9 shallow angular lobes; stamen column anther-bearing at the summit; style branches linear, stigmatic along the inner side; carpels beakless, arranged in a circle, 1-seeded. Flowers in ours fascicled in the leaf-axils.

Stem erect; leaves sharply 5-7-lobed; petals thrice the length of the sepals..................................	*M. sylvestris* 1.
Stem procumbent; leaves obscurely lobed; petals twice the length of the sepals..............................	*M. rotundifolia* 2.

1. **M. sylvestris** L. (*High Mallow.*) Biennial, with branched stem, 6-9 dm. tall; leaves roundish-kidney-shaped, heart-shaped or truncate at base; flowers reddish-purple, 2.5-4 cm. broad, showy; carpels about 10, flat on the back, rugose-reticulated.—Escaped from cult., and established along roadsides, Miller and Clarke. Nat. from Eu. Summer.

2. **M. rotundifolia** L. (*Cheeses, Common Mallow.*) Low biennial, from a deep root; leaves crenate, on very long petioles, round-heart-shaped; flowers small, pale blue or white; carpels about fifteen, round on the back.—A common little weed of farmyards and lawns. Nat. from Eu. The fruits have a cheese-like taste. Summer.

3. HIBISCUS L. Mallow

Herbs or shrubs with large showy flowers; staminal column bearing anthers for much of its length; fruit a 5-celled pod.

1. **H. Moscheutos** L. (*Swamp Rose Mallow.*) Tall perennial (1-3 m.); stem puberulent at the top; leaves toothed, pointed, generally whitened-downy beneath and mostly glabrous above; bracts and calyx densely stellate-pubescent; petals 6-12 cm. long, rose-color; capsule abruptly beaked, subglobose, glabrous.—Rather rare in our area, but growing in showy clumps in places much frequented and hence one of the well-known beauties of the vegetation of our region. Wolf Lake, Lake George, mouth of Dune Creek, and found just outside our limits in the mouth of the Galien River at New Buffalo. Summer.

ST. JOHN'S-WORT FAMILY (Hypericaceae)

Smooth herbs or shrubs with opposite, entire, translucently dotted, sessile leaves and no stipules; flowers solitary or cymose, regular, the sepals and petals in our species 5, the stamens few or mostly numerous, the sepals persistent; styles persistent.

1. HYPERICUM L. St. John's-wort

Flowers cymose, yellow, flesh-color or purplish; sepals subequal; petals oblique; stamens frequently united or clustered in 3-5 groups; fruit a pod.

- Petals pink or purple; leaves clasping.......................... *H. virginicum* 12.
- Petals yellow.
  - Shrubs.
    - Styles 5; pods 5-celled; branchlets 2-edged; flowers few in a cluster.................................. *H. Kalmianum* 4.
    - Styles 3; pods 3-celled; branchlets 4-angled; flowers numerous in compound clusters................ *H. prolificum* 3.
  - Herbs, at most barely woody at the base.
    - Leaves reduced to mere scales; plant fastigiately branched; stems and branches wiry-linear................. *H. gentianoides* 11.
    - Leaves larger; plant not wiry or fastigiately branched.
      - Stamens in 3-5 clusters; petals marked with black dots or lines.
        - Petals bearing black dots only on the margin...... *H. punctatum* 2.
        - Petals with several rows of black dots............ *H. perforatum* 1.
      - Stamens not clustered, only 5-12.
        - Inflorescence bracts leafy, though reduced in size.
          - Leaves roundish-ovate, triangular or round-oblong, more or less clasping.
            - Styles short, distinct; stigmas capitate.
              - Leaves ovate-oblong, round at tip; pod short-ellipsoid.......................... *H. mutilum* 6.
              - Leaves ovate-triangular, acute or bluntish; pod slender-conical................. *H. gymnanthum* 7.
            - Styles more or less united; stigmas long; pod 5-celled.............................. *H. ellipticum* 5.
          - Leaves lanceolate to linear, merely sessile.
            - Leaves lanceolate, 5-7-nerved................ *H. majus* 9.
            - Leaves linear, 1-3-nerved................... *H. canadense* 10.
        - Inflorescence bracts reduced to extremely narrow scales.................................. *H. boreale* 8.

1. **H. perforatum** L. Stem much branched and corymbed, somewhat 2-edged, producing runners from the base; leaves elliptic- or linear-oblong; flowers numerous, in open leafy cymes; petals deep yellow; stamens numerous; pod 3-celled.—A bad weed with acrid juice, nat. from Eu.; waste ground throughout. Summer.

2. **H. punctatum** Lam. Stem sparingly branched, roundish; plant black-dotted and pellucid-dotted throughout; leaves oblong, rounded at the tip, the base sub-clasping or sessile; flowers crowded; petals pale yellow; pod 3-celled. (*H. maculatum* Walt. not Crantz.)—In sandy fields and low damp ground throughout. Summer.

3. **H. prolificum** L. Shrub 6-10 dm. tall, often widely branching; leaves linear-oblong to lanceolate, obtuse but with a minute short tip, narrowed to a short petiole; flowers solitary or in one or more

pairs in the upper axils and in small terminal clusters; flowers about 2 cm. across, on short pedicels; fruit about 1 cm. long.—Swampy ground of the Calumet District. Summer. A pretty flower.

4. **H. Kalmianum** L. Shrub 3-7 dm. tall; branches 4-angled; leaves oblanceolate or linear-oblong, narrowed at the base and glaucous underneath; flowers generally at the end of a branchlet in a small compound cyme, the blossoms 2-2.5 cm. across, on short pedicels; capsules 8 mm. long.—A beautifully flowered species, characteristic both of dry dune hollows and the margins of lakes and ponds throughout. Summer.

5. **H. ellipticum** Hook. Stem simple, 2-5 dm. tall, obscurely 4-angled, rising from a creeping stoloniferous base; leaves elliptical-oblong, obtuse, narrower toward the sub-clasping base, thin; cyme few-flowered; petals bright yellow, 6-10 mm. long.— In wet swales along the borders of Long Lake and moist open woods, Tremont and Port Chester. Summer.

6. **H. mutilum** L. Stem weak, widely branching, with decumbent base; leaves ovate to narrowly oblong, obtuse, 5-nerved, partly clasping; cyme diffuse, with successively narrower bracts; flowers 4 mm. broad.—In low ground, Whiting to Dune Park. Summer.

7. **H. gymnanthum** Engelm. & Gray. Stems scarcely or not branched, 3-9 dm. tall; leaves heart-shaped; cyme without leaves but with very small bracts; pods 4-5 mm. long, slenderly conical.—A coastal plain species, found in lagoons and ponds near Miller. Summer.

8. **H. boreale** (Britton) Bicknell. Stems slender, leafy-bracted and reclining at base, or, if submersed, much elongated; leaves sessile, 3-5-nerved, elliptic; sepals slender and shorter than the rounded pod. —In ponds among the dunes, Dune Park to Tamarack Sta. Summer.

9. **H. majus** (Gray) Britton. Annual or perennial by leafy offshoots; stems stout, 1-7 dm. tall, often clustered; leaves 5-7-nerved, the base sessile or clasping, rounded or heart-shaped, the blades lanceolate; cymes naked but for a few slender bracts; pod conical-ellipsoid, blunt.—Shores of Mud Lake and ponds near Tamarack Sta. Pepoon reports it from Whiting.

10. **H. canadense** L. Similar; stem 1-4 dm. tall and slender; leaves 1-3-nerved, linear oblanceolate or narrower, rounded at the tip, narrowed to the very short petioled or sessile base; cymes naked but for the very narrow stiff bracts; pod purplish, slender-conical.—Wet sandy ground, Miller to Michigan City. Summer.

11. **H. gentianoides** (L.) BSP. (*Orange Grass, Pinweed.*) Bushy-branched, 1-3 dm. tall; leaves minute awl-shaped scales, appressed to the stem; flowers minute, sessile along the erect branches; pods ovoid-lanceolate, acute. (*Sarothra* L.)—A curious little plant with orange-colored stems, growing like a weed in waste places, but native, and found also in wet sandy ground throughout. Summer.

12. **H. virginicum** L. (*Marsh St. John's-wort.*) Plant reclining, or erect, with stoloniferous branches; leaves with a broad base, oblong or ovate, very obtuse, thickish, often pink or purplish, glaucous beneath;

flowers in axillary and terminal leafy clusters; stamens mostly 9, in 3 bundles; styles 3, distinct. (*Triadenum* Raf.; *Elodes* Nutt.; *Gardenia* Farwell.)—A striking plant of swamps, bogs, and margins of sloughs, throughout. Summer.

WATERWORT FAMILY (Elatinaceae)

Small marsh annuals with minute flowers in the axils of opposite leaves; stipules membranous; sepals and petals 2-5, distinct; stamens as many or twice as many; pods 2-5-celled.

1. ELATINE L. Waterwort

Node-rooting, dwarf plants; sepals, petals, stamens, and styles or sessile capitate stigmas 2-4; cells of the membranaceous pod the same number.

1. **E. americana** (Pursh) Arn. 1-2.5 cm. tall, in tufts, creeping; leaves obtuse, obovate; flowers sessile; seeds 5-6 in each cell, ribbed and cross-ribbed.—Inconspicuous, rooting in mud, and submerged or emersed, appearing like weed seedlings; the flowers of some aquatic states rarely open. Rare, around ponds of the Calumet District. Summer.

ROCKROSE FAMILY (Cistaceae)

Our species herbs or low shrubs with simple and mostly entire leaves, the lower usually opposite, the upper alternate; flowers regular; sepals 5, the two external much smaller, bract-like or sometimes none; petals 3 or 5 or none, early deciduous; stamens numerous; ovary 1; fruit a capsule opening by valves; seeds several or numerous.

Petals 5, yellow, soon deciduous, or none.	
Leaves broad, lanceolate or oblong....................	*Helianthemum* 1.
Leaves scale-like, overlapping.........................	*Hudsonia* 2.
Petals 3, greenish or purplish, persistent.................	*Lechea* 3.

1. HELIANTHEMUM Mill. Rockrose

Woody herbs, more or less branching, with showy flowers which open only once in sunshine and shed their petals by the next day, or with some flowers without petals.

1. **H. canadense** (L.) Michx. (*Frostweed.*) Stem slender, erect, 3-5 dm. tall, hoary-canescent; leaves pale beneath, lance-oblong; flowers solitary, 2.5 cm. broad; flowers without petals appearing later in the season.—Locally frequent in the dunes and sometimes in sandy parts of the Calumet District. Late in autumn the stems exude beautiful "ice-crystals." Summer and autumn.

2. HUDSONIA L. Poverty-weed

Bushy, heath-like little shrubs covered with awl-shaped alternate persistent leaves and producing numerous small but brilliant flowers crowded along the upper part of the branches. Pod enclosed in the calyx.

1. **H. tomentosa** Nutt. (*False Heather.*) Densely tufted and intricately branched and matted, with stout ascending branches; leaves close-pressed and overlapping, 2 mm. long; flowers sessile.—A characteristic little hoary plant of the evergreen dunes, occurring south to Liverpool, but only locally abundant; it sometimes forms mounds of considerable extent and grows in company with *Selaginella rupestris, Polytrichum commune, Opuntia Rafinesquii*, etc.

3. LECHEA L. Pinweed

Slender, erect, paniculately branched herbs producing leafy shoots at the base; flowers minute; stigmas 3, plumose; pod ovoid or globular. Flowers opening at noon.

Leaves of the basal shoots elliptical or oblong.	
Pubescence of the stem spreading; panicle of small dense corymbose clusters	*L. villosa* 1.
Pubescence of the stem appressed; panicle open.	
Outer sepals exceeding the inner	*L. minor* 2.
Outer sepals shorter than the others	*L. maritima* 3.
Leaves of the basal shoots narrowly lanceolate to linear.	
Stem leaves narrowly linear; inner sepals 1-nerved, shorter than the outer	*L. tenuifolia* 6.
Stem leaves oblong-lanceolate; inner sepals 3-nerved, equalling or exceeding the outer.	
Plants canescent.	
Panicle very narrow	*L. stricta* 4.
Panicle broadly pyramidal	*L. maritima* 3.
Plants glabrous or sparingly pubescent, but not canescent.	
Fruiting calyx obovoid, 1.5-2 mm. broad	*L. Leggettii* 7.
Fruiting calyx depressed-globose, 2.5-3 mm. broad	*L. intermedia* 5.

1. **L. villosa** Ell. 3-7 dm. tall, stout, simple, very leafy, giving off leafy runners at the base; leaves alternate and opposite or whorled, mucronate-pointed; flowers crowded; pedicels shorter than the minute pod.—Common, dunes and sand ridges, throughout. Summer.

2. **L. minor** L. 3-6 dm. tall, branching above; leaves whorled or opposite; panicle leafy; flowers crowded.—Dry sandy ground, occasional throughout. Summer.

3. **L. maritima** Leggett. Stout and rigid, 3-5 dm. tall, pale; leaves hoary-pubescent, thickish, narrow; panicle broadly pyramidal; calyx canescent.—Rare, at Miller. A coastal plain species. Summer.

4. **L. stricta** Leggett. Branched, the branches erect and crowded, and covered with a fine, pale, appressed pubescence; pod 1.6-2 mm. thick.—In open sandy soil of the Calumet District.

5. **L. intermedia** Leggett. 3 dm. or more tall, narrow and compact, ultimately glabrous; panicle subcylindrical and long; pod 2-3 mm. thick. (*L. minor* Hook., not L.)—Rare, acc. to Hill, in dry soil of the Calumet District, near the Lake, growing with blueberries and huckleberries.

6. **L. tenuifolia** Michx. Low and widely branching; flowers almost sessile, in a racemose panicle.—Dune meadows, Port Chester, rare.

7. **L. Leggettii** Britton & Hollick. Slender, glabrate, 3-5 dm. tall; leaves green, slender; panicle open, diffuse, ovoid-pyramidal.—In sandy ground from Gary to Dune Park, occasional. Summer.

VIOLET FAMILY (Violaceae)

Herbs with alternate stipulate leaves and axillary, nodding, irregular flowers, the corolla of 5 petals and 5 persistent sepals, the 5 stamens converging over the club-shaped style which bears a stigma turned to one side; fruit a capsule which splits open, discharging the many seeds.

1. VIOLA L. Violet

Petals somewhat unequal, the lower spurred at the base; the two lower stamens spurred, projecting into the spur of the corolla; sepals with ear-shaped appendages.

Beside the conspicuous blossoms there are often small nearly colorless flowers (cleistogamous flowers) borne on peduncles or runners, often borne under the leaves, and never opening, which are self-fertilized and set seed which comes true to the species; the showier blossoms are generally cross-fertilized by insects from other closely related species, setting but little seed, and this generally producing hybrid plants more or less unlike the parent species. Hybrids are therefore common, and make identification of violets difficult for those unfamiliar with the pure species. Bull. 224 of the Vermont Experiment Station, well illustrated, gives a sketch of the pure species of violets; Bull. 239 treats of the hybrids. Both are recent works.

Plants stemless, the leaves and scapes arising directly from the runners or rootstocks.	
Leaves pedately or palmately cleft or lobed.	
Leaves with 3 primary pedate divisions, these often again variously 3-5-lobed	*V. pedata* 1.
Leaves with 5-9 simple, palmate lobes	*V. palmata* 4.
Leaves simple, or somewhat lobed or shallowly cleft near the base, but not deeply cleft or lobed.	
Flowers lilac to purple, only abnormally white; rootstock fleshy or thickened, without runners.	
Leaves heart-shaped.	
Plants glabrous or practically so.	
Beard hairs of the lateral petals strongly knobbed.	*V. cucullata* 2.
Beard hairs of the lateral petals not strongly knobbed	*V. papilionacea* 3.
Plants more or less pubescent.	

Flowers violet to lavender or rarely white....... *V. sororia* 5.
Flowers dark violet-purple...................... *V. palmata* 4.
Leaves not heart-shaped, usually lobed or sharply dentate toward the base.
Leaves pubescent, ovate-oblong.................. *V. fimbriatula* 6.
Leaves glabrous.
Leaves lanceolate.............................. *V. sagittata* 7.
Leaves deltoid................................. *V. emarginata* 8.
Flowers very pale or pure white; rootstock producing slender runners.
Leaves lanceolate or narrower.................... *V. lanceolata* 9.
Leaves ovate or broader.
Leaves ovate, acute or barely heart-shaped at base. *V. primulifolia* 10.
Leaves heart-shaped.
Leaves wholly glabrous......................... *V. pallens* 11.
Leaves pubescent at least on one side.
Lateral petals beardless...................... *V. blanda* 12.
Lateral petals bearded........................ *V. incognita* 13.
Stems leafy.
Stipules entire, the lower papery; spur short; style knob-like.
Petals yellow.
Plants sparsely pubescent; stem short and leafy, its leaves less than 7 cm. broad............... *V. eriocarpa* 14.
Plants softly and prevailingly pubescent; stems sparingly leafy, their leaves mostly more than 7 cm. broad............................ *V. pubescens* 15.
Petals white within, violet-tinged outside............. *V. canadensis* 16.
Stipules fringed-toothed, more or less leaf-like; spur twice as long as broad, or more; style slender.
Tip of the style bent downward.
Petals white or cream color....................... *V. striata* 17.
Petals pale violet, or purple...................... *V. conspersa* 18.
Style straight and glabrous; lateral petals beardless; spur slender, 10-12 mm. long...................... *V. rostrata* 19.

1. **V. pedata** L. (*Bird-foot Violet.*) Nearly glabrous, the leaves 3-divided, with 3-5-parted or -cleft lateral divisions; flowers 2-3 cm. broad, the upper petals dark pansy violet, the others lilac, all beardless; stamens orange-tipped, large, conspicuous in the center of the flower. (Var. *bicolor* Pursh.)—Our most elegant violet, growing in open sandy soil of the Calumet District, Pine, Miller and Gary. Spring. It is rather rare, and with us is more frequently represented by:

Var. **lineariloba** DC. All petals the same lilac color.—Common locally in sterile sunny situations throughout. Though the forms with the petals all white or all roseate have not been found in our region, they may be looked for.

2. **V. cucullata** Ait. Leaves acute, except the earliest; flowers violet-blue becoming darker at the throat, on peduncles taller than the leaves; spurred petal shorter than the lateral ones, smooth. White or pale lavender flowers are often found.—Wet places, frequent throughout. Spring.

3. **V. papilionacea** Pursh. Robust; leaves often triangular in outline above the cordate base and sometimes as much as 12 cm. broad;

petals deep violet, but white or greenish-yellow at the base, or wholly white; spurred petal smooth, narrow and boat-shaped.—Moist meadows and groves, and low prairies, throughout. Spring.

4. **V. palmata** L. Early summer leaves 5-9-parted or -lobed, the segments variously toothed or cleft, the middle segment broadest; early spring leaves often undivided; lower leaf surfaces densely villous; flowers 2-3 cm. broad, violet-purple, paler without; peduncles generally overtopped by the leaves.—Moist prairies of the Calumet District, along the Illinois-Indiana state line. Spring.

5. **V. sororia** Wild. Resembling *V. papilionacea* in size and habit; leaves more or less villous-pubescent; spring flowers on peduncles about as long as the leaves; outer sepals ciliolate below the middle.—In low rich woods, Tremont. Spring and summer.

6. **V. fimbriatula** Sm. Early leaves obtuse, ovate, the later acute, ovate-oblong; peduncles longer than the leaves; flowers violet purple. (*V. ovata* Nutt.; *V. sagittata* in part of old reports.)—Along shady margins of sloughs, Clarke and perhaps elsewhere. The erect rootstock becomes in time decidedly stout. While in flower this is a low-growing inconspicuous violet, in fruit it attains robust stature. Spring, summer.

7. **V. sagittata** Ait. Leaves halberd-shaped, oblong-ovate and pointed at the tip, and at the lower end with distinct lobes on each side of the heart-shaped sinus, these lobes more or less deeply parted; petals violet purple. Our plants are generally distinctly pubescent, which has caused them to be distinguished as an endemic species (*V. subsagittata* Greene) which is, however, not distinct in any other regard.—Perhaps the commonest violet of our area, certainly commonest in the high dune country; found along margins of ponds and lakes, in wet meadows, and moist thickets. Spring, summer.

8. **V. emarginata** Le Conte. Mature leaves triangular, obscurely crenate-serrate above the middle, coarsely toothed below; petals violet blue, frequently shallowly notched at the extremity.—In dry woods, Michigan City. Summer and spring.

9. **V. lanceolata** L. With leafy stolons often bearing apetalous flowers; leaves and scapes glabrous, 5-8 cm. tall at spring-flowering, gradually tapering to a long, margined, generally red petiole; lateral petals beardless.—Very common on wet prairies, in moist dune meaddows, around sloughs and bogs, throughout.

10. **V. primulifolia** L. Leaves with subcordate, truncate, or tapering base, oblong or ovate, usually glabrous, slightly crenate-serrate; flowers as in the preceding.—Rare, an eastern species found on the lowlands of the Calumet River at Miller, and in a railroad ditch at Tamarack Sta. Spring.

11. **V. pallens** (Banks) Brainerd. Leaves obtuse or rarely acute, heart-shaped; petioles and stems often red-dotted and bearing scattered hairs; lateral petals usually tufted; upper petals broadly obovate. —Marshes and tamarack bogs of the high dune country. Spring, summer.

12. **V. blanda** Willd. Glabrous but for minute white hairs on the upper surface of the basal lobes of the leaf; leaves commonly acute, the midribs, petioles and stems red-tinged; upper pair of petals long, narrow, strongly curled back, lateral petals beardless; leafy runners are produced in summer.—In moist thickets throughout, especially on the banks of the Deep River and in the Nyssa woods at Mineral Springs. Spring.

13. **V. incognita** Brainerd var. **Forbesii** Brainerd. Pubescence as in the preceding, the summer leaves large, rugose, broadly heart-shaped, acute; lateral petals bearded, upper pair obovate.—In low moist woods, Tamarack Sta. and Mineral Springs. Perhaps elsewhere. Early spring.

14. **V. eriocarpa** Schwein. Stems usually several; 1-3 basal leaves from one rootstock; this not very clearly marked species passes into No. 15. (*V. scabriuscula* Schwein.)—In low rich woods. Early spring.

15. **V. pubescens** Ait. 2-4 dm. tall; stems usually solitary and frequently unaccompanied by basal leaves, or with 1 long petioled root leaf; stem leaves 2-4, near the summit, broadly ovate; petals purple-veined.—Low woods and wooded dunes, from Miller eastward, through the dune country. Spring.

16. **V. canadensis** L. 3-4 dm. tall; leaves serrate, pointed, heart-shaped; spurred petal yellow at base and dark-striped.—Rare, in beech woods from Tremont eastward, to the Michigan boundary. Spring and summer.

17. **V. striata** Ait. 15-30 cm. tall at flowering time, finally much taller, practically glabrous; leaves crenate-serrate, acute, heart-shaped; stipules large, oblong-lanceolate; spur thick, shorter than the petals.—Frequent in young pine groves, Pine and Miller. Spring, summer.

18. **V. conspersa** Reichenb. Rootstock branched, oblique; stem 8-15 cm. tall at flowering time; lower leaves round-kidney-shaped, upper round-heart-shaped, crenate; flowers numerous, pale, raised above the leaves on long axillary peduncles. Summer leaves much larger. (*V. labradorica* of old local reports, but not of Schrank.)—Low or shaded ground, frequent, Whiting to Miller and eastward through the dune meadows. Spring, summer.

19. **V. rostrata** Pursh. (*Long-spur Violet.*) Stems generally numerous, 1-1.2 dm. tall; leaves round-heart-shaped, glabrate, serrate; petals lilac color with a violet spot near the center; flowers high above the leaves; the very long slender spur is distinct from that of any other violet.—A handsome plant which has been reported (H. & R.) as very rare from woods at Miller; it is not certain that this report is correct, but the plant occurs in beech woods just east of our area. Spring, summer.

LOOSESTRIFE FAMILY (Lythraceae)

Herbs or barely woody plants (in our species) with 4-6-sided branches and entire leaves, these opposite, or whorled, or alternate above and opposite below; stipules none; flowers perfect, regular in our species, the petals commonly clawed, deciduous, 4-7 or none;

calyx with sinuses provided with appendages resembling the true sepals which may be inconspicuous; calyx tube enclosing but not adherent to the 1-4-celled ovary, and the thin, many-seeded capsule; style 1, often inconspicuous; stigma capitate; petals and stamens borne on the calyx; the stamens and style are often of reciprocally different lengths.

Calyx short, campanulate or globular.
  Stamens 4; capsule splitting along the valves; petals minute.. *Rotala* 1.
  Stamens 8 or 10; capsule splitting between the valves; petals showy.................................. *Decodon* 2.
Calyx tubular, cylindrical; stamens 6 or 12................ *Lythrum* 3.

1. ROTALA L. Toothcup

Low annual glabrous herbs with mostly solitary axillary flowers; calyx 4-lobed with appendages in the sinuses; petals 4; stamens short.

1. **R. ramosior** (L.) Koehne. 5-14 cm. tall, slender, with linear-oblanceolate leaves tapering to a short petiole; flowers small; style almost none.—Swamps, mud, and low ground. Mineral Springs and Miller. July-September.

2. DECODON J. F. Gmel. Swamp Loosestrife

Perennial herbs or plants somewhat woody at the base, with opposite or whorled leaves and axillary clusters of flowers; calyx with 5-7 erect teeth and as many longer and spreading horn-like processes in the sinuses; stamens exserted, of 2 lengths; capsule globose, 3-5-celled.

1. **D. verticillatus** (L.) Ell. Stems 6-25 dm. long, often recurved-arching, 4-6-sided; plant smooth or downy; leaves nearly sessile, often whorled, lanceolate; flowers in the axils of the upper leaves, in whorls; petals 5, lilac or magenta; stamens 10.—In swamps and lakes and around tamarack bogs, northern Calumet District, especially Wolf Lake, and eastward in bogs among the high dunes. The submerged parts of the stems are spongy and white. July-September.

3. LYTHRUM L. Loosestrife

Slender herbs with 5-7-toothed calyx, the sinuses provided with appendages; petals 5-7; stamens as many or twice as many, inserted low down on the calyx; capsule subcylindrical, 2-celled.

1. **L. alatum** Pursh. Stems wand-like, smooth, with margined angles, the leaves acute, heart-shaped or rounded at base, linear-lanceolate to oblong-ovate, the upper alternate; appendages of the calyx larger than the true sepals; petals deep purple; stamens 5-7, those on short-styled flowers long-exserted.—On moist prairies of the Calumet District, and in dune meadows. June-August.

L. Salicaria L., intr. from Eu., is a plant with showy purple flowers in crowded but interrupted whorls, petals 6, stamens 12, that was noted twenty-five years ago as a waif at Aetna, acc. to Pepoon.

MEADOW-BEAUTY FAMILY (Melastomaceae)

Our species herbs with opposite, 3-7-ribbed leaves; flowers 4-parted, perfect, regular, the tube of the calyx adhering to the 2-4-celled ovary; style 1, slender; stigma 2-4-lobed or capitate.

1. RHEXIA L. Meadow-beauty

Low perennial hispid herbs with showy cymes of flowers, the petals easily falling; calyx urn-shaped, persistent; stamens 8; anthers long; stigma 1; capsule 4-celled; seeds coiled like a snail shell.

1. **R. virginica** L. (*Deergrass.*) Stem square, with wing-like angles, stout, 3-4.5 dm. tall; leaves oval-lanceolate, acute, sessile; cyme peduncled; calyx tube and pedicels glandular-hispid; petals glandular-hispid outside, magenta; anthers linear, curved, with a minute spur on the back of the attachment of the filament, above the base.—A beautiful little plant of dune meadows and the muddy margins of sloughs.

CACTUS FAMILY (Cactaceae)

Fleshy, mostly leafless plants, with spines; stems columnar or flattened, jointed; flowers sessile, solitary; sepals and petals numerous and overlapping in several rows; ovary cohering with the calyx; stamens numerous, inserted on the inside of the cup formed by the sepals and petals; style 1; stigmas numerous; flowers showy.

1. OPUNTIA Mill. Cactus

Stems with flattened joints; leaves reduced to awl-like scales, with spines in their axils; sepals and petals spreading, the inner roundish.

1. **O. Rafinesquii** Engelm. (*Prickly-pear, Indian Fig.*) Dark green, prostrate, with obovate or roundish joints 7-12 cm. long, and bright red-brown bristles with a few small spines and one long strong one in the center, or none; flowers yellow, the center often red, 6-9 cm. broad; petals 10-12; fruit red, club-shaped, not spiny. (*O. humifusa* Raf.)—A characteristic plant of the high dunes; the flowers are handsome and the attractive crimson fruit is edible but rather insipid. July.

OLEASTER FAMILY (Eleagnaceae)

Shrubs with entire, opposite, silvery-scaly leaves, in our species, and axillary clustered flowers with sexes on different plants; calyx urn-shaped, 4-lobed; petals none; stamens 8, attached on the throat of the calyx; ovary 1; fruit drupe-like, the calyx thickening and enclosing the nut or achene.

1. SHEPHERDIA Nutt.

Flowers small, sessile, clustered, or the female solitary; male flowers with stamens alternating with processes of the thick disk; style slender; stigma 1-sided; fruit berry-like.

1. **S. canadensis** (L.) Nutt. Shrub 1-2 m. tall; leaves lanceolate, elliptical or ovate, silvery-downy and scurfy with rusty scales beneath, or the upper ones green above; fruit yellowish-red. (*Lepargyrea* Greene.)—Ridges, slough banks, and prairies of the Calumet Region; the fruit is not edible like that of the buffalo-berry (*S. argentea*). In our area the leaves are generally much narrower and shorter than the average. Summer.

WILLOW-HERB FAMILY (Epilobiaceae)

Herbs without stipules other than occasional glands; parts of the flower in fours, rarely in twos, threes, fives, or sixes; calyx tube adhering to the 2-4-celled ovary; petals sometimes none, if present inserted on the calyx with the stamens which are as many or twice as many as the petals; style slender, bearing a 2-4-lobed or capitate stigma. (*Onagraceae.*)

- Calyx limb divided to the summit of the ovary, persistent in fruit; stamens 4.................................. *Ludwigia* 1.
- Calyx tube deciduous from the fruit; stamens 8 or 2.
  - Petals 4; fruits not bur-like; stamens 8.
    - Filaments not provided with scale-like appendages; fruit pod-like and splitting at maturity.
      - Flowers white or rose-colored; seeds silky........... *Epilobium* 2.
      - Flowers yellow or rarely white; seeds not silky....... *Oenothera* 3.
    - Filaments each provided with a scale-like basal appendage; fruit dry and not splitting; flowers white or rose-colored; seeds not silky................... *Gaura* 4.
  - Petals 2, notched or 2-lobed; stamens 2; fruit a bristly hard pod not splitting at maturity.................... *Circaea* 5.

1. LUDWIGIA L. False Loosestrife

Perennials with axillary or rarely capitate flowers; calyx tube not at all prolonged beyond the ovary; capsule short or cylindric, many-seeded; petals 4 or none.

- Leaves all alternate and sessile.
  - Flowers with conspicuous, soon deciduous yellow petals 8-16 mm. long, equalling the leafy lobes of the calyx; peduncles in the upper axils; capsule longer than broad...................................... *L. alternifolia* 1.
  - Flowers small, sessile, in the axils; petals greenish and small, or none; much-branched erect plants sending out prostrate shoots with spatulate leaves; capsules as broad as long.
    - Runner leaves obovate, glandular-denticulate; bractlets minute or none; capsule globular or depressed, not longer than the calyx lobes................ *L. sphaerocarpa* 2.
    - Runner leaves spatulate but with an acute tip, entire, bractlets awl-shaped, conspicuous; capsule 4-sided, top-shaped, longer than the calyx lobes......... *L. polycarpa* 3.
- Leaves opposite; stems creeping or floating; petals none or small and reddish when the plants grow out of water. *L. palustris* 4.

1. **L. alternifolia** L. (*Seedbox.*) Smooth and branching, 1 m. tall, with clustered roots; leaves very long and narrow, acute; capsule wing-angled.—Swamps and ditches of the dune region. The petals drop off as soon as the plant is touched. Summer.

2. **L. sphaerocarpa** Ell. Bark often spongy-thickened below; stem leaves linear-lanceolate, acute.—In our region known only from the waters of Mud Lake, but may be looked for elsewhere. A coastal plain species. Summer.

3. **L. polycarpa** Short & Peter. Stem stoutish; leaves narrowly lanceolate, acute.—Ditches and swamps, Clarke, Miller, and Dune Park. Summer.

4. **L. palustris** (L.) Ell. (*Marsh Purslane.*) Smooth; leaves ovate or oval, tapering to a slender petiole; calyx lobes very short; capsule 4-sided, sessile in the axils. (*Isnarda* L.)—Frequent in ditches, swamps and lakes, from Wolf Lake eastward through the dune country. Summer.

2. EPILOBIUM L. Willow-herb

Perennials with nearly sessile leaves, the calyx tube not prolonged beyond the ovary, the limb 4-cleft; petals 4; capsule slender, many-seeded.

Petals entire and large; calyx limb divided to the summit of the ovary; styles and stamens at length all deflexed; stigma lobed; flowers racemose.................... *E. angustifolium* 1.
Petals notched; calyx tube prolonged beyond the ovary; stamens and style erect; flowers corymbed or panicled or a few axillary.
Stem roundish; leaves entire or subentire with revolute margins, not decurrent; silks of the seeds dingy.
A fine short dense spreading pubescence all over stem and pods.................................. *E. molle* 2.
Glabrous, or with ashy appressed or incurved hairs.
Plant branching; leaves closely pubescent above..... *E. lineare* 3.
Plant simple; leaves glabrous above or with a few hairs....................................... *E. palustre* 4.
Stem somewhat angled with the decurrent lines running down from the leaf bases; leaves toothed, flat, without revolute margins.
Leaves elongate-lanceolate; seeds abruptly contracted, the silky tufts light brown.................... *E. coloratum* 5.
Leaves ovate to oblong; seeds gradually narrowed to a hyaline neck, the silky tufts white.............. *E. glandulosum* 6.

1. **E. angustifolium** L. (*Fireweed.*) Plants 0.3-2 m. tall, simple; leaves pinnately veined, lanceolate; petals magenta pink or pure white; silky tufts of the seeds white. (*Chamaenerion* Scop.)—A very brilliant and graceful weed, springing up on burned-over grounds and around bogs; locally abundant, throughout. Summer.

2. **E. molle** Torr. Erect, 2-15 dm. tall, simple, grayish throughout; leaves narrowly lanceolate; petals pink, 7-8 mm. long; seeds bearing minute nipple-shaped projections. (*E. strictum* Muhl.)—In peat bogs of the high dune country. July-September.

3. **E. lineare** Le Conte. Erect, 3-10 dm. tall, much branched and very leafy, minutely hoary-pubescent; leaves linear, revolute; petals pink or white, 3-5 mm. long. (*E. densum* Raf.)—This species often produces red winter buds in the axils of the leaves or on rare stoloniferous shoots. In swamps, Clarke and Dune Park and in the bogs at Mineral Springs. July-September.

4. **E. palustre** L. A decumbent simple plant, or sparingly branched, chiefly glabrous, and producing stolons at its base; leaves thin, remote, not hoary; flowers few; petals pink or white, 5-7 mm. long.—In bogs at Pine, rare. July, August.

5. **E. coloratum** Muhl. Erect, not stoloniferous though developing winter rosettes, 3-9 dm. tall, canescent above, glabrous below; leaves elongate-lanceolate, distinctly short-petioled; flowers abundant on the numerous upper branches; petals pink, 3-5 mm. long; seeds covered with minute nipple-like projections.—Swamps, ditches and bogs, especially in the mouth of Dune Creek, in swamps at Tamarack Sta., in the tamarack bog at Mineral Springs, and in wet grassy swales, Clarke. July-September.

6. **E. glandulosum** Lehm. var. **adenocaulon** (Haussk.) Fernald. 1-10 dm. tall, resembling the preceding but sometimes glandular, the leaves oblong-lanceolate to narrowly ovate, subsessile, less toothed; seeds similar, short-beaked. (*E. adenocaulon* Haussk.)—Burned-over bogs, Pine, Miller, and Indiana Harbor. July-September.

3. OENOTHERA L. Evening Primrose. Sundrops

Leaves mostly alternate; calyx-tube prolonged beyond the ovary, deciduous, with 4 reflexed lobes; capsule 4-valved, many-seeded.

KEY TO FLOWERS

Flowers white (*Sect. Hartmannia*)	*O. speciosa* 9.
Flowers yellow.	
Calyx segments distinct, reflexed (*Sect. Onagra*).	
Petals rhombic-ovate	*O. rhombipetala* 3.
Petals obovoid.	
Leaves entire or sparingly denticulate	*O. muricata* 1.
Leaves repandly denticulate, sinuately toothed or pinnatifid.	
Petals 1.5-2.5 cm. long	*O. biennis* 2.
Petals 0.5-1.2 cm. long	*O. laciniata* 4.
Calyx segments adhering in pairs, erect (*Sect. Kneiffia*).	
Petals 0.5-1 cm. long	*O. pumila* 5.
Petals 1.2-3 cm. long.	
Stems covered with long, soft, widely spreading hairs	*O. pratensis* 8.
Stems merely puberulent, or glabrous.	
Leaves denticulate	*O. fruticosa* 6.
Leaves entire	*O. linearis* 7.

KEY TO FRUITS

- Fruit short, obovoid to ellipsoid, 4-angled, and strongly ribbed (*Sect. Hartmannia*) .... *O. speciosa* 9.
- Fruit elongated, subcylindrical or somewhat tetragonal.
  - Seeds in 2 rows in each cell (*Sect. Onagra*).
    - Pods thickish, tapering from a thickish base.
      - Bracts or floral leaves exceeding the pods .... *O. muricata* 1.
      - Bracts or floral leaves, at least the upper, shorter than the pods .... *O. biennis* 2.
    - Pods more slender, of practically uniform diameter.
      - Pods in a distinct terminal spike .... *O. rhombipetala* 3.
      - Pods in the axis of foliage leaves .... *O. laciniata* 4.
  - Seeds in a single row in each cell (*Sect. Kneiffia*).
    - Mature capsules clavate-linear, not or scarcely stipitate. *O. pratensis* 8.
    - Mature capsules with body clavate to oblong and more or less stipitate.
      - Inflorescence in fruit usually more than half the height of plant .... *O. pumila* 5.
      - Inflorescence in fruit much less than half the height of plant.
        - Mature capsule body decidedly clavate, pubescent, with normally incurved, glandless hairs and a few gland-tipped hairs among them.......... *O. linearis* 7.
        - Mature capsule body oblong; pubescence with short, straight, gland-tipped hairs or sometimes none. *O. fruticosa* 6.

1. **O. muricata** L. var. **canescens** (T. & G.) Robinson. (*Evening Primrose.*) Hoary-pubescent or somewhat silky throughout; stem simple or nearly so, 2-8 dm. tall, very leafy; leaves lanceolate, ascending, entire, or sparingly denticulate; bracts leafy; petals 1.2-2 cm. long, light yellow, obovate; capsule sub-spindle-shaped. (*O. canovirens* Steele; *Onagra strigosa* Rydb.)—A coarse plant, in thickets and sandy fields back of the high dunes around Tremont and probably elsewhere. The flowers open in evening, and close in morning. Summer.

2. **O. biennis** L. (*Evening Primrose.*) Mostly simple-stemmed, 3-15 dm. tall, stout, more or less spreading-pubescent; leaves oblong-lanceolate or narrower, rarely broader, repandly denticulate; bracts lanceolate; petals light yellow, obovate; calyx-tube 2.5-3.5 cm. long; pod more or less hirsute. (*Onagra* Scop.)—Common coarse weed of fields and thickets, throughout. The flowers are nocturnal. Summer.

3. **O. rhombipetala** Nutt. (*Evening Primrose.*) More slender, lower, rarely branching, appressed-puberulent and subcanescent; leaves narrowly lanceolate, subentire or denticulate, or rarely pinnatifid at the base, merging gradually into the conspicuous bracts of the inflorescence; calyx silky-canescent, with a tube 2-3.5 cm. long; petals 1.2-2.5 cm. long. (*Raimannia* Rose.)—Rather a handsome species with nocturnal flowers, locally abundant, as at Clarke, Miller and Mineral Springs in sand. Summer.

4. **O. laciniata** Hill. Stems decumbent and branching, or less often erect and simple, usually coarsely hairy or puberulent; leaves oblong, coarsely toothed or cleft. (*Raimannia* Rose; *O. sinuata* L.)—A weedy plant, rare, in dry open thickets back of the high dunes. Spring and early summer.

5. **O. pumila** L. (*Sundrops.*) 1-6 dm. tall, puberulent; leaves entire, glabrous, obtuse, the basal spatulate, the stem leaves narrowly oblanceolate; spikes loose, at first nodding; pods slightly winged. (*Kneiffia* Spach. Further synonymy suggested by various recent writers is: *O. perennis* L.; *K. perennis* Pennell.)—Rare on prairies of the Calumet District, as at Gibson. June, July. Flowers closing at night.

6. **O. fruticosa** L. (*Sundrops.*) 3-9 dm. tall, puberulent or glabrous; leaves linear-lanceolate, ciliate; spikes narrow-bracted, on naked peduncles; petals 1.4-2.6 cm. long, bright yellow. (*Kneiffia* Raimann. Further synonymy suggested by various recent writers is: *O. tetragona* Roth; *K. tetragona* Pennell; *O. hybrida* Michx.) — A very showy and beautiful species, common in open sand throughout. The flowers close at night. June-July.

7. **O. linearis** Michx. (*Sundrops.*) 2-9 dm. tall, puberulent; leaves narrowly oblanceolate to linear, minutely puberulent; petals 1.2-3 cm. long, clear yellow.—(*Kneiffia linearis* Spach.)—In sandy pine woods, Dune Park, and perhaps elsewhere. Summer. The flowers close at night.

8. **O. pratensis** (Small) Robinson. (*Sundrops.*) 3-6 dm. tall; leaves oblong-lanceolate; lower flowers in the axils of foliage leaves; calyx lobes spreading, with long leafy hispid tips; petals 1.5-2.5 cm. long, showy. (*Kneiffia* Small.)—Rare, on the prairies at the southwestern extremity of our area. Summer.

9. **O. speciosa** Nutt. (*White Evening Primrose.*) Reclining or erect perennial with sinuate-pinnatifid or strongly repand, narrow leaves; petals 2.5-4 cm. long. (*Hartmannia* Small.)—A showy, weedy species native of the Great Plains and nat. along railroad tracks in the Calumet District.

Meriolix serrulata (Nutt) Walp. is a somewhat shrubby plant with broadly ovate, yellow petals, and funnel-shaped calyx tube with flaring lobes, native of the Great Plains, which was for some years established along railroad tracks in our area but is probably not persistent. (*Oenothera* Nutt.)

4. GAURA L.

Leaves sessile, alternate; flowers white or rose-color, fading red, in racemes or spikes, never very large; calyx tube much prolonged beyond the ovary, deciduous, with 4 or rarely 3 reflexed lobes; petals clawed, unequal or turned to the upper side; stamens often turned down, as is the long style; stigma 4-lobed, surrounded by a ring; fruit hard and nut-like, 3-4-ribbed, 1-4-seeded.

Flowers 8-10 mm. broad	*G. biennis* 1.
Flowers 3-6 mm. broad	*G. parviflora* 2.

1. **G. biennis** L. Soft-hairy or downy, 1-3 m. tall; leaves denticulate, oblong-lanceolate; spikes wand-like; flowers sessile, white turning pink; fruit 4-6 mm. long, ribbed, downy, 4-angled, acute at both ends, ovoid-spindle-shaped.—Prairies and dry oak woods of the Calumet District. Summer.

2. **G. parviflora** Dougl. Stem 1-3.6 m. tall, soft-villous and puberulent; leaves repand-denticulate, ovate-lanceolate, soft-pubescent; spikes dense; flowers pink, fading red; fruit club-shaped or spindle-form, narrowed to both ends, 4-nerved, obtusely angled above, 6-8 mm. long.—In dry soil around Michigan City. Summer.

5. CIRCAEA L. Enchanter's Nightshade

Low perennials with opposite leaves on slender petioles and small whitish flowers in racemes; calyx tube slightly prolonged, the end filled by a disk; lobes 2, reflexed.

Leaves rounded at the base, firm of texture; fruit round-pear-shaped, 2-celled, with stiff bristly hairs	*C. latifolia* 1.
Leaves heart-shaped at the base, thin; fruit 1-celled, obovoid, with soft slender hairs	*C. alpina* 2.

1. **C. latifolia** (Hill) Fernald. 3-9 dm. tall; leaves ovate-oblong, slightly toothed; bracts none. (*C. lutetiana* of Am. auths., not L.)—A common inconspicuous little plant of oak barrens among the high dunes. Midsummer.

2. **C. alpina** L. 7-20 cm. tall, smooth, weak; leaves coarsely toothed, shining; bracts minute.—Rare in wet woods north of Tamarack Sta. Summer.

C. intermedia Erhr. is a poorly marked species resembling *C. alpina* except the fruit, which is similar to that of *C. latifolia*. It is reported by Pepoon from woods at Mineral Springs.

WATER MILFOIL FAMILY (Myriophyllaceae)

Perennial aquatic or marsh herbs with inconspicuous symmetrical perfect flowers, or with the sexes in different flowers, the flowers sessile in the axils of bracts or leaves; limb of the calyx obsolete or very short; petals small or none; stamens 1-8; ovary of 2-4 carpels; styles or sessile stigmas distinct; fruit 1-4-celled, a pod or drupe.

Leaves alternate; stamens 3, the flowers 3-merous and fruit 3-lobed	*Proserpinaca* 2.
Leaves whorled; stamens 1, 4 or 8, but not 3.	
Leaves pinnately parted, or at any rate toothed; flowers 4-merous, the stamens 4 or 8; fruit deeply 4-lobed	*Myriophyllum* 1.
Leaves strictly entire; calyx entire; style and stigma 1, the flowers generally on the plan of 1; fruit 1-celled, 1-seeded	*Hippuris* 3.

1. MYRIOPHYLLUM L. Water Milfoil

Leaves crowded, those under water pinnately parted into capillary divisions; flowers sessile in the axils of upper leaves, usually above water; sexes imperfectly united in the same flower, or in different parts of the same inflorescence, the upper male, the intermediate polygamous, the lower female; petals 4 or none; the 4 stigmas recurved; fruit nut-like, 4-celled.

Stamens 4; petals rather persistent; carpels rough or tuberculate	*M. heterophyllum* 3.
Stamens 8; petals early deciduous; carpels smooth.	
Leaves rather rigid, their rachises of about the same diameter as the segments	*M. exalbescens* 1.
Leaves flabby, their rachises somewhat broader than the segments	*M. verticillatum* 2.

1. **M. exalbescens** Fernald. Stems glabrous, purple until they dry, then turning chalky white; flowering stems leafy; leaves comb-like pinnatifid, at least the submersed ones; flowers whorled in a naked interrupted spike; bracts mostly shorter than the flowers, ovate, entire or rarely toothed; sepals of the male flowers deep purple; fruit subglobose, 2-3 mm. long, slenderly 4-furrowed. (*M. spicatum* of auths., not L.)—In Wolf Lake and the Grand Calumet River.

2. **M. verticillatum** L. var. **pectinatum** Wallr. Floral leaves or bracts somewhat firmer than the submersed vegetative leaves which are divided into linear-filiform segments; spike practically naked; flowers equalling or exceeding the bracts; stigmas recurved, elongate; sepals of the male flowers pinkish or pale green; fruit subglobose, 2.5-3 mm. long.—In ponds, locally throughout.

3. **M. heterophyllum** Michx. Stem stout; rachis somewhat broader than the linear-filiform segments of the submersed leaves; spikes 1-3 dm. long; floral leaves crowded; fruit 1-1.5 mm. long.—Rare, in slow streams and lakes.

2. PROSERPINACA L. Mermaid-weed

Perennials with creeping stems; leaves alternate, the submersed mostly pinnately dissected; flowers perfect, small, sessile, solitary or 3-4 in the axils; calyx tube 3-sided, the limb 3-parted; petals none; stamens and stigmas 3; fruit bony, 3-4-angled, 1 nutlet in each cell.

1. **P. palustris** L. Leaves subtending flowers and fruit lanceolate and sharply serrate, the other leaves cleft to the rachis, comb-like; fruit globose, sharply angled.—Common in Wolf Lake, and in the Grand Calumet and sloughs of the Calumet District. Summer.

Var. **amblyogona** Fernald. Fruit subglobose or ellipsoid, 3.5-4.5 mm. long, 2.5-3.5 mm. thick, with obtuse or rounded angles.—In Wolf Lake.

3. HIPPURIS L. Mare's-tail

Perennials with simple leaves bearing minute sessile flowers in their axils; flowers perfect or polygamous; style thread-shaped, stigmatic down one side; anther large; fruit nut-like.

1. **H. vulgaris** L. Stems 1.5-6 dm. long, more or less erect, simple; leaves in whorls of 6-12, acute, linear; fruit 2 mm. long or less. (*Limnopeuce* Greene.)—Long ago reported (H. & R.) from the Grand Calumet at Miller, and very possibly still present but not recently detected.

GINSENG FAMILY (Araliaceae)

Herbs, shrubs, or trees, differing from the *Umbelliferae* by having usually more than 2 styles, and a drupe fruit with few-several cells; petals 5, not inflexed; stamens 5, alternate with the petals; in our genera the leaves are compound.

Leaves alternate, compound, the ultimate divisions pinnate; carpels 5; fruit black............................ *Aralia* 1.
Leaves whorled, palmately 3-7-foliate; carpels 2-3; fruit red or yellow.. *Panax* 2.

1. **ARALIA** L. Sarsaparilla. Spikenard

Leaves compound or decompound; flowers white or green, in umbels or panicles, polygamous; ovary 5-celled; petioles sheathing at the base; stipules none, or inconspicuous; pedicels jointed below the flowers; fruit a small berry enclosing about 5 seeds.

Umbels numerous in large compound panicles; leaves very large, decompound; stem strictly herbaceous........ *A. racemosa* 1.
Umbels mostly 2-7, corymbed; stem short, somewhat woody.
  Stem 4-9 dm. tall, bristly, leafy........................ *A. hispida* 2.
  Stem scarcely rising out of the ground, not bristly, bearing only a single long-stalked leaf.................... *A. nudicaulis* 3.

1. **A. racemosa** L. (*Spikenard.*) Roots large, spicy-aromatic; stem widely branched; leaflets heart-shaped-ovate, doubly serrate, slightly downy, pointed; umbels racemose; styles united.—In rich woods, Pine, and Keiser, rare. July, August.

2. **A. hispida** Vent. (*Bristly Sarsaparilla, Wild Elder.*) Stem terminating in a peduncle bearing several umbels; leaves twice-pinnate, with acute, serrate, oblong-ovate leaflets.—In low woods, borders of tamarack bogs, and dune hollows, frequent throughout in the dune country, rarer in the Calumet District, but has been found at Griffith. Mrs. Chase noted at Dune Park that colonies of plants were connected by rootstocks. June, July.

3. **A. nudicaulis** L. (*Wild Sarsaparilla.*) Rootstocks long, aromatic; stem naked but for the single leaf, bearing 2-7 umbels; leaflets oblong-ovate or oval, serrate, pointed.—In moist thickets, rare at Clarke and Pine, but common in dune woods. May, June.

2. **PANAX** L. Ginseng

Herbaceous perennials springing from tubers or roots, with simple erect stems; leaves in a single whorl, palmate; umbels solitary, terminal, simple; carpels 2-3.

Root large, spindle-shaped, often forked; leaflets long-stalked; fruit red.............................. *P. quinquefolium* 1.
Root or tuber globular; leaflets sessile; fruit yellowish..... *P. trifolium* 2.

1. **P. quinquefolium** L. (*Ginseng.*) Root aromatic, 1-2 dm. long; stems 3 dm. tall; leaflets mostly 5, pointed, obovate-oblong, large,

thin; styles mostly 2.—Rare, in rich woods of the Calumet District. Lyon found a single plant in rich woods at Tremont. The root is much sought by pharmacists as it is purchased for a large price by the Chinese as a panacea. Its medicinal properties are probably very mild. July.

2. **P. trifolium** L. (*Dwarf Ginseng.*) Root or tuber deeply buried; stem 1-2 dm. tall; leaflets 3-5, obtuse, narrowly oblong; styles usually 3.—Rare in rich woods, East Chicago and Miller, but common in dune woods. Spring.

PARSLEY FAMILY (Umbelliferae)

Herbs, with hollow stems, the leaves generally alternate and often compound, with expanded petioles sheathing the base; inflorescence generally a compound umbel, with an involucre at the base and the umbellets frequently subtended by involucels; flowers small; calyx 5-toothed, tube adhering to the 2-celled ovary; petals and stamens 5, inserted on the ovary disk; fruit of 2 dry but often oily carpels cohering on the inner face and often ribbed. Many species poisonous.

KEY TO LEAVES AND FLOWERS

- Leaves simple, undivided, sometimes slightly lobed.
  - Leaves narrow, spiny-toothed.......................... *Eryngium* 2.
  - Leaves not as above.
    - Leaves reduced to hollow jointed petioles.............. *Oxypolis* 20.
    - Leaves roundish or ovate, slender-petioled, peltate..... *Hydrocotyle* 6.
- Leaves or some of them pinnate, ternate, digitate, decompound or lobed.
  - Involucre and involucels none.
    - Flowers yellow.
      - Leaves ternately compound...................... *Taenidia* 16.
      - Leaves pinnately compound...................... *Pastinaca* 19.
    - Flowers white.
      - Leaves 3-foliate................................ *Cryptotaenia* 12.
      - Leaves simply pinnate.......................... *Pimpinella* 15.
  - Involucre or involucels or both present.
    - Both involucre and involucels present.
      - Involucres leafy, decompound..................... *Daucus* 1.
      - Involucres not as above.
        - Flowers greenish or yellowish; leaves digitately compound.............................. *Sanicula* 3.
        - Flowers white; leaves pinnately compound.
          - Terrestrial plants.
            - Leaves filiform............................ *Carum* 10.
            - Leaves broader........................... *Osmorhiza* 5.
          - Aquatic or marsh plants.
            - Involucre conspicuous..................... *Berula* 13.
            - Involucre not especially showy.
              - Calyx teeth minute.
                - Outer petals 2-cleft.................... *Heracleum* 21.

Petals all entire.
Leaves simply pinnate (except the submerged ones).................. *Sium* 11.
Leaves 2-3-pinnately compound........ *Conioselinum* 22.
Calyx teeth conspicuous.................. *Oxypolis* 20.
Either the involucre or involucels present, but not both.
Involucre present; involucels none.................. *Erigenia* 7.
Involucre absent; involucels present.
Flowers white.
Low terrestrial plants.
Stems strictly erect........................ *Cryptotaenia* 12.
Stems procumbent or at least partly creeping.
Petals inflexed at the summit.............. *Chaerophyllum* 8.
Petals not inflexed at the summit.......... *Spermolepis* 4.
Tall perennial aquatic or marsh plants.
Calyx teeth prominent...................... *Cicuta* 9.
Calyx teeth minute.
Stem woolly at least in part................ *Heracleum* 21.
Stem smooth............................ *Conioselinum* 22.
Flowers yellow or purple.
Plants wholly glabrous....................... *Zizia* 14.
Plants in some part pubescent.
Joints of the stem pubescent................ *Thaspium* 17.
Pedicels and involucels pubescent............ *Polytaenia* 18.

KEY TO FRUITS

Fruit bristly or warty.
Leaves rigid, spiny, simple............................ *Eryngium* 2.
Leaves soft, not spiny, lobed or compound.
Leaves palmately lobed or compound................. *Sanicula* 3.
Leaves pinnately compound.
Umbel few-rayed.
Fruit linear-oblong............................ *Osmorhiza* 5.
Fruit ovate................................ *Spermolepis* 4.
Umbel dense.............................. *Daucus* 1.
Fruit not bristly or warty.
Fruit not flattened................................. *Thaspium* 17.
Fruit flattened.
Fruit strongly flattened laterally.
Carpels also flattened, at least a little.
Carpels flattened laterally or scarcely at all flattened.
Fruit longer than broad...................... *Cryptotaenia* 12.
Fruit as broad as long or broader.
Umbels simple; leaves round................ *Hydrocotyle* 6.
Umbels compound; leaves ternately decompound............................ *Erigenia* 7.
Carpels flattened dorsally; fruit short.
Leaves pinnate............................ *Pimpinella* 15.
Leaves palmately compound.................. *Taenidia* 16.
Carpels nearly round, somewhat flattened.
Fruit linear-oblong............................ *Chaerophyllum* 8.

Fruit broader.
Leaves decompound.
Fruit with flat corky ribs; marsh plants....... *Cicuta* 9.
Fruit with inconspicuous filiform ribs; terrestrial plants.......................... *Carum* 10.
Leaves once pinnate.
Ribs of fruit thick and corky; fruit ovate to oblong.......................... *Sium* 11.
Ribs of fruit inconspicuous, filiform.
Fruit ovate to oblong..................... *Zizia* 14.
Fruit globose.............................. *Berula* 13.
Fruit strongly flattened dorsally.
Fruit with thick corky margins; ribs obscure........ *Polytaenia* 18.
Fruit without thick corky margins; ribs filiform, inconspicuous but not obscure.
Ribs with thin wings.......................... *Pastinaca* 19.
Ribs with broad wings.
Stem woolly................................. *Heracleum* 21.
Stem glabrous.
Leaves simply pinnate...................... *Oxypolis* 20.
Leaves 2-3-pinnately compound............. *Conioselinum* 22.

1. DAUCUS L. Carrot

Bristly annuals or biennials with compound umbels and oblong, dorsally flattened fruits, the carpels with 5 slender, bristly primary ribs and 4 winged secondary ones.

1. **D. Carota** L. (*Queen-Anne's Lace.*) Biennial with bristly-hairy stem; leaves divided into lanceolate sharp-pointed segments; umbels broad, generally depressed in the center, or finally convex; flowers white or pink, the central one in each umbel generally purple.—Very common weed with thickened tap root. Garden form is common carrot. Intr. from Eu., and nat. June-October.

2. ERYNGIUM L. Button Snakeroot

Perennials with thick leaves and bracted flowers in dense, sessile, button-like heads; calyx with prominent, rigid, persistent teeth; fruit ovate or obovate, scaly, not ribbed.

1. **E. yuccifolium** Michx. (*Eryngo.*) Stout, 0.5-2 m. tall, branching above; leaves as much as 1 m. long, lanceolate, parallel-veined, remotely spiny, the lower forming a basal rosette, the upper clasping, shorter; heads globose, prickly with the rigid persistent involucre; fruit very small. (*E. aquaticum* of auths. and old reports but not L. 1753.)—A curious, yucca-like plant, characteristic of the prairie region, and also found in dune meadows. July, August.

3. SANICULA L. Sanicle. Black Snakeroot

Perennial tall glabrous plants with palmately lobed or parted leaves, the basal long-petioled; umbels irregular or compound; umbellets in round heads; calyx teeth conspicuous, persistent; flowers greenish or yellowish; fruit globular, the carpels cohering, ribless, hooked-prickly, with long styles in our species.

Fruit sessile, 6-7 mm. long	*S. marilandica* 1.
Fruit stalked, 3-4 mm. long	*S. gregaria* 2.

1. **S. marilandica** L. 3-10 dm. tall; leaves 5-7-parted, the divisions sharply serrate, acute; some umbels often wholly of male flowers.—Woods and thickets, Calumet District and wooded dunes. Early summer.

2. **S. gregaria** Bicknell. 6 dm. tall; leaves 5-foliate.—Rich dune woods around Tremont and probably elsewhere. Early summer.

4. SPERMOLEPIS Raf.

Slender, smooth, branching annuals with filiform leaflets and very small white flowers in unequal-rayed umbels, and ovate fruit without ribs but with scales, bristles, or warts.

1. **S. patens** (Nutt.) Robinson. Stem geniculate, about 0.5 m. tall; rays of the umbellets few; fruit small, merely warty.—A weed along railroad tracks; nat. from farther west. June.

5. OSMORHIZA Raf. Sweet Cicely

Roots thick, aromatic; leaves ternately compound with ovate, toothed leaflets; flowers white; umbels few-leaved, few-flowered; calyx teeth obsolete; fruit slender, curved, aromatic, black and shining, hooked-prickly, attenuate at base.

1. **O. Claytoni** (Michx.) Clarke. (*Wild Licorice.*) Stems 3-9 dm. tall, villous-pubescent or glabrous; leaflets rather long and sparsely cleft; stipules ciliate-hispid. (*Washingtonia* Britton; *O. brevistylis* DC.)—In thickets and woods of the prairie region, and rare in rich dune woods. June. Fruit, which adheres to clothing by means of hooks, smells strongly of anise.

6. HYDROCOTYLE L. Water Pennywort

Low glabrous marsh or aquatic perennials; stems creeping; leaves peltate; flowers in simple umbels or clusters, small, white; calyx teeth obsolete; carpels with 2 of the ribs enlarged and forming a thickened margin.

1. **H. umbellata** L. Leaves small, round, crenate; umbels many-flowered; peduncles arising from creeping rootstocks; fruit strongly notched, the dorsal rib broad, obtuse, corky.—A curious little coastal plain species occurring in swamps and lagoons of the Post-Tolleston Beaches. Summer.

7. ERIGENIA Nutt. Harbinger-of-Spring

Low, glabrous, simple-stemmed perennial with 1 or 2 leaves, these 2-3-ternately divided; umbel leafy-bracted, few-flowered; calyx teeth obsolete; petals conspicuous, spatulate, flat, entire, white; fruit laterally flattened, with carpels incurved and nearly kidney-shaped, bearing 5 slender ribs.

1. **E. bulbosa** (Michx.) Nutt. 1-2 dm. tall; leaf segments oblong; fruit broader than long, minute.—A delicate, pretty little flower appearing in earliest spring. Rare in rich dune woods.

8. CHAEROPHYLLUM L. Spreading Chervil

Low annuals with ternately decompound leaves and few-rayed umbels; fruit notched at the base, narrowly oblong to linear, with equal ribs.

1. **C. procumbens** (L.) Crantz. Stems spreading, slender, more or less hairy; leaflets pinnatifid with obtuse lobes; fruit narrowly oblong, glabrous, with broad intervals between the ribs.—A weedy little plant with fragrant foliage. Frequent along the Calumet River system.

9. CICUTA L. Water Hemlock

Stout, tall, aquatic or marsh plants with compound leaves, serrate leaflets, compound large umbels, conspicuous calyx-teeth and glabrous, ovoid or nearly round fruits with strong flattish corky ribs. All parts of the plants are deadly poisonous.

Stem stout; leaflets lanceolate or broader; upper axils not bearing bulblets	*C. maculata* 1.
Stem slender; leaflets linear; upper axils bearing clusters of bulblets	*C. bulbifera* 2.

1. **C. maculata** L. (*Spotted Cowbane.*) Stem 1-2 m. tall, purple-spotted; leaves 2-3-pinnate, the lower long-petioled; rays of the umbellets numerous, unequal; fruit about 3 mm. long.—Frequent in swamps, lakes, and stagnant streams. Midsummer.

2. **C. bulbifera** L. (*Beaver Poison, Musquash Root.*) Stem shorter, unspotted; leaves similar; fruit rare; reproduction generally asexual, by means of the bulblets in the leaf axils which drop in the mud and sprout.—In swamps, lakes and rivers. Midsummer.

10. CARUM L. Caraway

Slender smooth herbs with spindle-shaped or tuberous roots and pinnate leaves; calyx teeth small; fruit oblong or ovate; ribs slender.

1. **C. Carvi** L. Biennial, branching, not more than 5 dm. tall; leaves with filiform divisions.—Intr. from Eu. and escaped cult. Calumet District. Midsummer. May be gathered for spice, but care should be taken not to confuse fruits with some poisonous umbellifer.

11. **SIUM** L. Water Parsnip

Smooth aquatic perennials with pinnate leaves; calyx teeth minute; fruit oblong to ovate with prominent corky equal wings.

1. **S. suave** Walt. Stem 1-2 m. tall, stout; leaflets 3-8 pairs, sharply serrate, 5-12 cm. long, linear or lanceolate or the lower submersed ones often finely dissected. (*S. cicutaefolium* Schrank.)—Common throughout in swamps, lakes, and streams. July-October.

12. **CRYPTOTAENIA** DC. Honewort

Glabrous perennials with 3-foliate thin leaves; calyx teeth obscure; fruit linear-oblong, smooth, with obtuse ribs.

1. **C. canadensis** (L.) DC. 3-9 dm. tall; leaflets large ovate, doubly serrate, sometimes lobed; umbels few-rayed, rays unequal; pedicels very unequal; fruit frequently curved. (*Deringa* Ktze.)—In rich soil along Dune Creek and Keiser. Rare. Summer.

13. **BERULA** Hoffm.

Smooth aquatic or marsh perennial with once-pinnate leaves and minute calyx teeth; fruit notched at base; carpels globose, with slender inconspicuous ribs.

1. **B. erecta** (Hudson) Coville. Up to 1 m. tall; leaflets 5-9 pairs, ovate to linear, serrate to cut-toothed, sometimes crenate; fruit very small.—Rather rare in marshy ground of the Calumet District. Summer.

14. **ZIZIA** Koch. Golden Alexanders

Smooth perennials with mostly thick compound leaves and yellow flowers; calyx teeth prominent; fruit ovate to oblong with inconspicuous ribs, the central fruit of each umbellet sessile.

1. **Z. aurea** (L.) Koch. Basal leaves long-petioled, uppermost leaves simple, all others 2-3-ternate; leaflets sharply serrate, acuminate; rays numerous, stout; flowers bright golden yellow, somewhat mustard-scented.—Occasional in thickets of the Calumet District and in rich dune woods. Spring and early summer.

15. **PIMPINELLA** L. Pimpernel

Smooth perennials with simply pinnate leaves and white flowers; calyx teeth obsolete; fruit oblong to ovate; ribs equal, slender.

1. **P. Saxifraga** L. 5 dm. tall, branched; leaflets toothed; fruit very small.—European waif nat. in urban regions of the Calumet District according to H. & R.

16. TAENIDIA Drude

Glabrous, glaucous perennials with ternate leaves and laterally flattened short-oblong wingless fruits.

1. **T. integerrima** (L.) Drude. Stem 0.5-1 m. tall, slender; leaves 2-3-ternate with ovate to lanceolate, entire leaflets; fruit oblong.—In dry thickets of the Calumet District. May, June.

17. THASPIUM Nutt. Meadow Parsnip

Perennials with ternately compound leaves (at least the upper) and yellow or purple flowers; calyx teeth conspicuous; fruit ovoid to oblong, slightly flattened dorsally, the carpels with some of the ribs strongly winged.

Flowers yellow	*T. barbinode* 1.
Flowers purple	*T. trifoliatum* 2.

1. **T. barbinode** (Michx.) Nutt. Tall, slender, loosely branched, pubescent at the base; leaves 1-3-ternate; leaflets acute, coarsely serrate, often ternately cleft; flowers pale yellow; fruit broadly oblong with about 7 wings.—Occasional in dune woods near Tremont.

2. **T. trifoliatum** (L.) Britton. Glabrous; upper stem leaves short-petioled, ternate or rarely biternate, the segments ovate or ovate-lanceolate; basal leaves long-petioled, sometimes undivided and resembling those of *Zizia*. (*T. aureum* Nutt. var. *atropurpureum* [Desr.] Coult. & Rose; *T. atropurpureum* Nutt.)—Woods back of the high dunes, Tremont. Summer.

18. POLYTAENIA DC.

Perennial plants with 2-pinnate leaves, the upper opposite and 3-cleft; calyx teeth conspicuous; fruit oval to obovate, dorsally much flattened with the lateral ribs large and corky and the dorsal small.

1. **P. Nuttallii** DC. Stem 0.5-1 m. tall, slightly scabrous; roots spindle-shaped; leaf segments distant; umbels 6-12-rayed; fruit ovate; flowers bright yellow.—A striking, stiffly erect plant, rare in prairie soil of the Calumet District. May.

19. PASTINACA L. Parsnip

Tall stout smooth perennials with pinnate leaves and yellow flowers; calyx teeth obsolete; fruit ovoid, much flattened dorsally, the dorsal ribs slender, the lateral flattened into broad, strongly nerved wings.

1. **P. sativa** L. Stem grooved; leaflets thickish, ovate to oblong, cut-toothed.—Intr. from Eu. and escaped cult., nat. abundantly on prairies and around cities of the Calumet District. Summer.

20. OXYPOLIS Raf. Cowbane

Smooth aquatic or marsh plants with conspicuous calyx teeth and white petals; fruit ovate or obovate, dorsally flattened, the lateral ribs broadly winged, closely set, strongly nerved next the body, giving the appearance of 5 dorsal ribs, but the real dorsal ribs inconspicuous.

1. **O. rigidior** (L.) Coult. & Rose. Stem 6-15 dm. tall; leaves simply pinnate with 3-9 oblong-lanceolate to linear leaflets with remote coarse teeth; roots bearing tuberoids. (*Tiedemannia* Coult. & Rose.)—A poisonous plant, frequent in swamps, lakes, and streams. September, October.

21. HERACLEUM L. Cow Parsley

Tall stout perennials with large compound leaves and broad umbels; fruit obovate, much flattened dorsally, the lateral ribs broadly winged and strongly nerved, the dorsal slender; petals white or purplish.

1. **H. lanatum** Michx. Stem 1-3 m. tall, grooved, woolly; leaves ternate; leaflets cut-toothed, broad; fruit large.—A rare plant of the Calumet District, in wet ground.

22. CONIOSELINUM Fisch. Hemlock Parsley

Tall slender glabrous perennials with finely 2-3-pinnately compound leaves and white flowers; calyx teeth obsolete; fruit strongly flattened dorsally, the primary ribs conspicuous, the lateral extended into broad distinct wings forming a double-winged margin of the fruit.

1. **C. chinense** (L.) BSP. Stem tall, stout, grooved, becoming reddish-glaucous in the inflorescence; leaflets pinnatifid; umbel compound.—Rather an elegant plant, frequent in swamps, especially around East Gary.

DOGWOOD FAMILY (Cornaceae)

Shrubs or trees or rarely woody-stemmed herbs, with bitter bark and simple leaves; calyx-tube adherent to the ovary, with almost no lobes; petals as many as the stamens or none; style 1; fruit a 1-2-seeded drupe.

Leaves opposite except in one species; flowers perfect, 4-merous, with petals	*Cornus* 1.
Leaves alternate; flowers polygamous, 5-merous, sometimes without petals	*Nyssa* 2.

1. CORNUS L. Cornel

Leaves entire; calyx minutely 4-toothed; petals 4, spreading, oblong; stamens 4; stigma terminal, flat or capitate; drupe containing a small 2-celled 2-seeded stone; flowers small, in open naked cymes or in close heads surrounded by a corolla-like involucre.

Flowers greenish or purple, in a close cluster, subtended by a petal-like, 4-leaved involucre; fruit red.

Low, almost herbaceous from a slender creeping and subterranean stem; bracts ovate, short-acuminate..... *C. canadensis* 1.

Tree with blunt and notched bracts.................... *C. florida* 2.

Flowers white, in open, flat, spreading cymes; involucres none; fruit blue or white.

Leaves alternate....................................... *C. alternifolia* 8.

Leaves opposite.

Pubescence woolly and more or less spreading.

Branchlets not brownish; fruit light blue.

Branchlets greenish; leaves woolly beneath........ *C. rugosa* 3.

Branchlets purple; leaves silky beneath........... *C. Amomum* 4.

Branchlets brownish; fruit pure white.............. *C. Baileyi* 5.

Pubescence closely appressed, straight and silky, or none.

Young branches red-purple; leaves ovate, roughish; cymes few-flowered, small and flat........... *C. stolonifera* 6.

Young branches gray; leaves ovate-lanceolate; cymes many-flowered, convex, loose, often branched.. *C. femina* 7.

1. **C. canadensis** L. (*Bunchberry, Dwarf Cornel.*) Leaves scarcely petioled, the lower scale-like, the upper crowded; flowers greenish-white, or the petals purple-tipped; fruit globose. (*Cornella* Rydb.; *Cynoxylon* Schaffner.)—A curious little plant found on the borders of tamarack swamps and in black gum woods, especially at Miller and Mineral Springs. A northern species. June, July.

2. **C. florida** L. (*Flowering Dogwood.*) A tree with light green bark when young, and gray or black, much fissured into small plates when old; the twigs have a characteristic upward turn and the branches a handsome pagoda-like droop. Bracts a creamy white; diameter of the flower cluster and bracts may be 5-9 cm. The fruit is ovoid. (*Cynoxylon* Raf.)—One of the most beautiful flowering trees in America. Wood red, strong, valued in cabinet work; bark medicinal. Found in dune woods and thickets from Miller eastward, especially around Michigan City; not in Calumet District. May.

3. **C. rugosa** Lam. Shrub 2-3 m. tall; branches warty-dotted; leaves round-oval, abruptly pointed; cymes flat. (*C. circinata* L'Hér.)—On open dunes and in low thickets. June.

4. **C. Amomum** Mill. (*Kinnikinnik.*) Shrub 1-3 m. tall; branchlets, stalks and petioles and lower leaf surfaces dull-silky. Similar to the preceding. (*C. sericea* L.)—Around sloughs and muddy lakes from Miller eastward. June.

5. **C. Baileyi** Coult. & Evans. Shrub with ovate to oval-lanceolate leaves, these spreading-woolly-pubescent above, subappressed-pubescent below.—On tops of dunes or edges of sloughs and in damp sandy dune hollows. July.

6. **C. stolonifera** Michx. (*Red Osier Dogwood.*) Leaves abruptly pointed, whitish underneath; shrub 1-2 m. tall; fruit white or lead color, rarely blue. Multiplies by prostrate shoots and forms large clumps.—Abundant on dunes from Miller eastward. A very handsome species. June-August.

7. **C. femina** Mill. (*Pigeon Berry.*) Much branched shrub 1-2.5 m. tall; leaves taper-pointed, whitened beneath; fruit white, on bright red pedicels. (*C. paniculata* L'Hér.)—A handsome plant found in low sandy thickets around Clarke and Whiting, apparently not in the high dunes. June, July.

8. **C. alternifolia** L. f. (*Green Osier.*) Shrub or tree 2-6 m. tall; branches greenish streaked with white; leaves clustered at the ends of branches, oval, long-pointed; cymes open and very broad; fruit deep blue on red stalks.—A beautiful shrub, rare from Miller eastward in dune woods. Early summer.

2. NYSSA L. Tupelo

Trees with entire or sometimes angulate-toothed leaves and greenish flowers; male flowers numerous, with small, 5-parted calyx; petals as in the female flowers or none; stamens mostly 10 (5-12), inserted on a convex disk; female flowers solitary or 2-8, sessile in a bracted cluster, much larger than the male, with very small fleshy deciduous petals or none; style elongated; 5-10 stamens are present in the female flowers, sometimes with perfect anthers, other times with obsolete ones; drupe ovoid, ellipsoid.

1. **N. sylvatica** Marsh. (*Black Gum.*) Middle-sized tree with furrowed dark bark and horizontal branches; leaves oval or obovate, commonly acuminate, glabrous or villous-pubescent when young, at least on the margins and midrib, shining above when old; fruit ovoid, acid, dark blue or black, 1-2 cm. long.—A very common tree in low marshy rich woods, especially on the borders of tamarack bogs. It is common behind the high dunes, but rare in the northern Calumet District and practically absent in the southern prairie districts. The leaves turn brilliant crimson in autumn. April, May.

WINTERGREEN FAMILY (Pyrolaceae)

Herbaceous plants, or the base a little woody, low growing, with solitary or, in ours, racemed or corymbed or umbelled flowers; foliage thick, evergreen; flowers regular, the calyx 5-lobed, free from the ovary, the corolla with 5 separate petals; stamens 10, free from the corolla but inserted with it; style 1; ovary and capsule 5- (rarely 4-) celled.

Stems leafy; flowers corymbed or umbelled; petals widely spreading; style very short and top-shaped; valves of the capsule smooth on the edges.................... *Chimaphila* 1.

Leaves chiefly basal; flowers racemed; petals not widely spreading; style long; valves of the capsule cobwebby on the edges.................................... *Pyrola* 2.

1. CHIMAPHILA Pursh. Pipsissewa

Long running underground shoots present; leaves shining, scattered or whorled along the short ascending stem; flowers on a terminal peduncle; stamens with enlarged and hairy filaments; anthers conspicuously 2-horned; stigma disk-shaped with 5-toothed border. Capsule as in *Pyrola* but splitting downward from the apex.

Leaves lanceolate or ovate-lanceolate, obtuse at base, the upper surface blotched with white	*C. maculata* 2.
Leaves wedge-lanceolate, not spotted	*C. umbellata* 1.

1. **C. umbellata** (L.) Nutt. var. **cisatlantica** Blake. (*Prince's Pine.*) 2-4 dm. tall; leafy, the leaves sharply serrate; peduncles 2-8-flowered; petals flesh-color; anthers violet.—In rich dune woods, pine groves, etc., near the lake shore, Lake and Porter Counties, and perhaps eastward, rare. July, August.

2. **C. maculata** (L.) Pursh. (*Ratsvein, Spotted Wintergreen.*) 1-2.5 dm. tall, the leaves chiefly on the lower part of the stem, remotely toothed; peduncles 1-5-flowered, the petals creamy white.—This species has been reported from pine woods near Whiting, a station now destroyed; Pine and Clarke, and, acc. to Hill, in dune hollows at Miller, with *Linnaea borealis.*

2. PYROLA L. Shin-leaf. Wintergreen

Smooth perennials with subterranean running shoots, bearing a cluster of roundish basal leaves on petioles; stem naked but for scaly bracts; flowers often nodding in a simple raceme; filaments naked; stigma 5-lobed, or 5-rayed; capsule depressed-globose, 5-lobed, 5-valved from the base upward.

Petals white or greenish-white.	
Style straight, narrower than the peltate 5-rayed stigma; petals and stamens erect and converging; leaves crenate-serrate	*P. secunda* 1.
Style strongly declined, the apex upwardly curved, longer than the converging or spreading petals; stigma much narrower than the truncate apex of the style; leaves denticulate or entire.	
Leaves roundish or broadly elliptical, thick, as short as or shorter than the petiole (sometimes leaves none).	
Leaves, if present, dull	*P. chlorantha* 2.
Leaves always present, shining	*P. americana* 4.
Leaves elliptical or obovate-oval, thin, dull, longer than the margined petiole	*P. elliptica* 3.
Petals pink or rose-purple	*P. asarifolia* 5.

1. **P. secunda** L. 1-2.5 dm. tall, the leaves sometimes on the lower part of the stem, ovate, mucronate, longer than the petiole; raceme spike-like, dense, the greenish flowers all turned to one side, scarcely nodding; style long-exserted. (*Orthilia parvifolia* Raf.)—In dune woods and thickets, Clarke, Miller to Mineral Springs. June-August.

2. **P. chlorantha** Sw. Leaves sometimes none, if present small; stem 0.5-3 dm. tall, naked or with a single bract, few-flowered; flowers greenish, rather inconspicuous; style but little exserted.—Rare, in open sandy woods from Whiting (formerly) southeastward in oak barrens of the Calumet District, also wooded dunes, Dune Park. June, July.

3. **P. elliptica** Nutt. 1-4 dm. tall; leaves elliptical, obovate or oval; raceme many-flowered; petals large, whitish, spreading, obovate.—A handsome plant, infrequent in rich woods, Pine, Miller, to Furnessville. June, July.

4. **P. americana** Sweet. 1-3.5 dm. tall, the stem bracted; raceme elongated, many-flowered, the flowers large, with roundish, thick, creamy white petals. (*P. rotundifolia* Michx., not L.; *P. rotundifolia* var. Fernald.)—A handsome species, occurring in sandy woods, Pine and Clarke to Tremont, rare. June-August.

5. **P. asarifolia** Michx. 1-3 dm. tall, the stems bracted; leaves broader than long, round-kidney-shaped, denticulate or entire, thick, glossy; raceme loose, elongated, the flowers 1-1.5 cm. broad; the style declined with upwardly curved apex.—Rare in cold wet woods, Miller and Dune Park. June-August.

INDIAN PIPE FAMILY (Monotropaceae)

Our species with flowers much as in the *Pyrolaceae* but the plants destitute of green foliage, and fleshy, being saprophytes in decaying vegetable matter, or parasites on roots.

Flowers solitary; style short and thick....................	*Monotropa* 1.
Flowers several in a raceme; style longer than the ovary....	*Hypopitys* 2.

1. MONOTROPA L. Indian Pipe

Low-growing plants, whitish, reddish or tawny, the clustered stems springing from a ball of fibrous matted rootlets; true leaves none, replaced by small scales; flowers solitary, with a calyx of 2-4 irregular scales or bracts and a short thick style; corolla of erect spatulate scale-like petals which are saccate at the base and tardily deciduous; stamens 8 or 10; filaments awl-shaped; stigma disk-like, 4-5-rayed; capsule ovoid, 4-5-celled, 8-10-grooved, with innumerable loose-coated seeds.

1. **M. uniflora** L. Smooth, waxy white, pinkish, or rarely reddish, turning black in drying, 0.5-3 dm. tall; flowers erect in bud, nodding in bloom, but the fruit, again, erect.—A curious and beautiful plant, mostly saprophytic, in rich glens and woods, Miller, Dune Park, and eastward to and beyond Michigan City. June-August.

2. HYPOPITYS Hill. Pinesap

Similar to *Monotropa*; racemes scaly; terminal flowers usually 5-merous, the rest 3-4-merous; sepals as many as the petals, bract-like; style hollow.

1. **H. lanuginosa** Nutt. Tawny, whitish or red, pubescent or downy, 1-4 dm. tall; flowers fragrant. (*Monotropa Hypopitys* L.; *H. Hypopitys* and *H. americana* Small.)—Rare, in rich dune woods; Miller, Tremont, Keiser, and beyond Michigan City. June-October.

HEATH FAMILY (Ericaceae)

Our species shrubs or creeping herbs with barely woody stems (*Gaultheria, Epigaea, Oxycoccus*), with chiefly alternate, often evergreen leaves and a 5-lobed calyx, and normally 5 united petals; flowers regular; stamens free from the corolla, 10 or sometimes 8; style 1; ovary 3-10-celled; fruit in ours a capsule or berry.

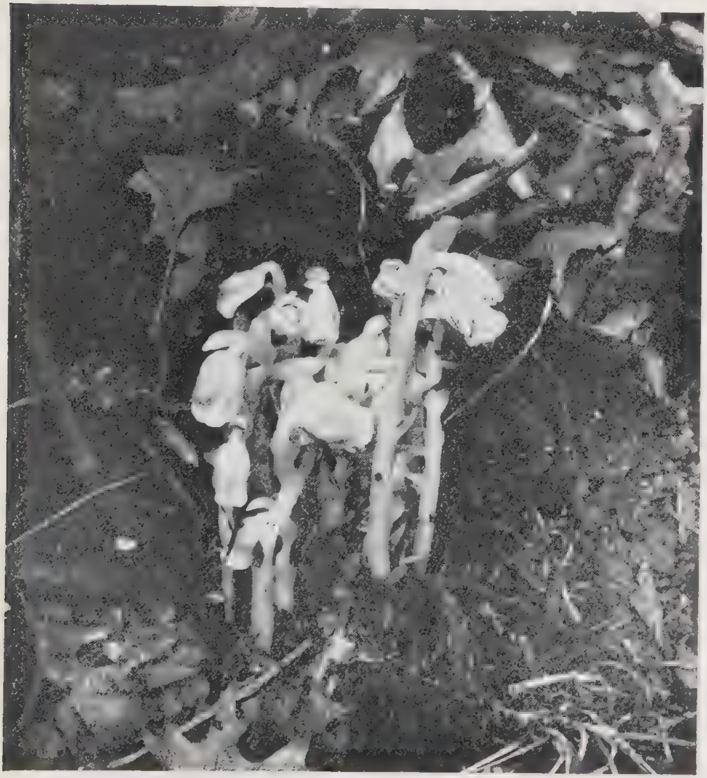


FIG. 23. INDIAN PIPE (*Monotropa uniflora*)

Calyx tube free from the ovary.
  Corolla urn-shaped; fruit berry-like.
    Flowers mostly single, axillary........................ *Gaultheria* 3.
    Flowers in terminal racemes or clusters............... *Arctostaphylos* 4.

Corolla not urn-shaped (*Gaultheria* might be sought here, as its corolla is occasionally ovoid-cylindraceous); fruit a dry capsule.

  Corolla cylindraceous; erect shrubs.................. *Chamaedaphne* 1.

  Corolla salver-shaped; trailing perennial herb with somewhat woody stem.......................... *Epigaea* 2.

Calyx tube united with the ovary.

 Leaves sprinkled with shining dots; ovary 10-celled; fruit containing 10 seed-like nutlets (large compared with the seeds of the next genera).................... *Gaylussacia* 5.

 Leaves generally not dotted; ovary and berry 4-5-celled or imperfectly 8-10-celled by false partitions, containing many small seeds.

  Corolla 5-toothed; anthers included; berry 10-celled; leaves deciduous........................... *Vaccinium* 6.

  Corolla 4-cleft; anthers exserted; berry 4-celled; leaves evergreen................................. *Oxycoccus* 7.

1. CHAMAEDAPHNE Moench. Leather-leaf

Branching low shrub with thick, nearly evergreen leaves that are scurfy, especially beneath; flowers in the axils of the upper leaves; calyx of 5 distinct, acute sepals; anther cells tapering to a tubular beak, awnless; capsule many-seeded, 5-celled, depressed.

1. C. calyculata (L.) Moench. 4-9 dm. tall, the branches at first woolly-pubescent and covered more or less with scurfy scales; leaves elliptic or oblanceolate, obscurely denticulate; corolla white, 5-6 mm. long. (*Andromeda* L.; *Cassandra* D. Don.)—Around acid bogs, forming zones of vegetation near blueberries. Flowers in early May, and sometimes in our region again in August, according to Mrs. Chase. Miller, Mineral Springs, etc., frequent in the high dune country, but rare in the Calumet District, as at Clarke.

2. EPIGAEA L. Mayflower

Prostrate or trailing, scarcely shrubby plant with rusty, bristly hairs and evergreen, reticulated, rounded and heart-shaped, alternate leaves on long petioles; flowers from scaly bracts, in close clusters; corolla tube hairy inside, as long as the scale-like, nearly distinct sepals; style slender, its apex forming a sort of ring around the 5 small stigma lobes.

1. E. repens L. (*Trailing Arbutus.*) Branching, the branches bristly-hirsute; leaves leathery, oval, oblong, or nearly round, the margin entire but ciliate; inflorescence a short raceme of about 6 flowers, from the upper axils; corolla pink or rose or white; flowers very fragrant; fruit globose, hirsute.—Rare in the Calumet District (shaded bank of Deep River) and in the western dunes, but becoming frequent or common in the dunes east of Michigan City, especially in pine woods. April.

3. GAULTHERIA L. Winterberry

Shrubby or subherbaceous creeping plants with ascending branches and evergreen alternate leaves, and axillary flowers, the pedicels 2-bractleted; corolla cylindrical-ovoid or urn-shaped, 5-toothed; capsule depressed, 5-lobed, many-seeded, forming a berry-like, globular, red fruit.

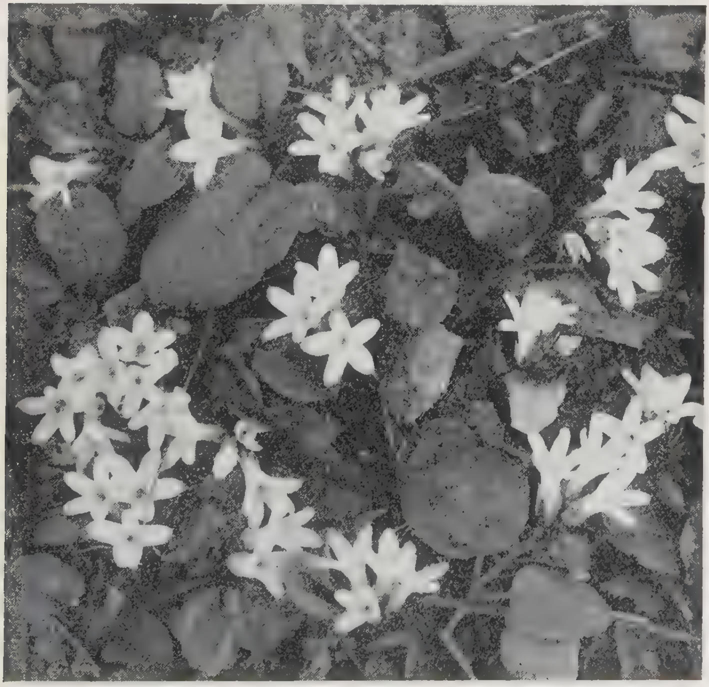


FIG. 24. TRAILING ARBUTUS (*Epigaea repens*)

1. **G. procumbens** L. (*Checkerberry.*) Stem extensively creeping below the surface, sending up short stems which are leafy at the summit; leaves obscurely serrate, oval or obovate; flowers nodding, white; berries bright red, spicy-aromatic, edible, tasting like sweet birch.—In damp acid soils, peats, blueberry bogs, etc., Clarke and Pine to the high dunes and throughout them. Flowers July, August; fruit October, November. The plant is a source of wintergreen oil or essence.

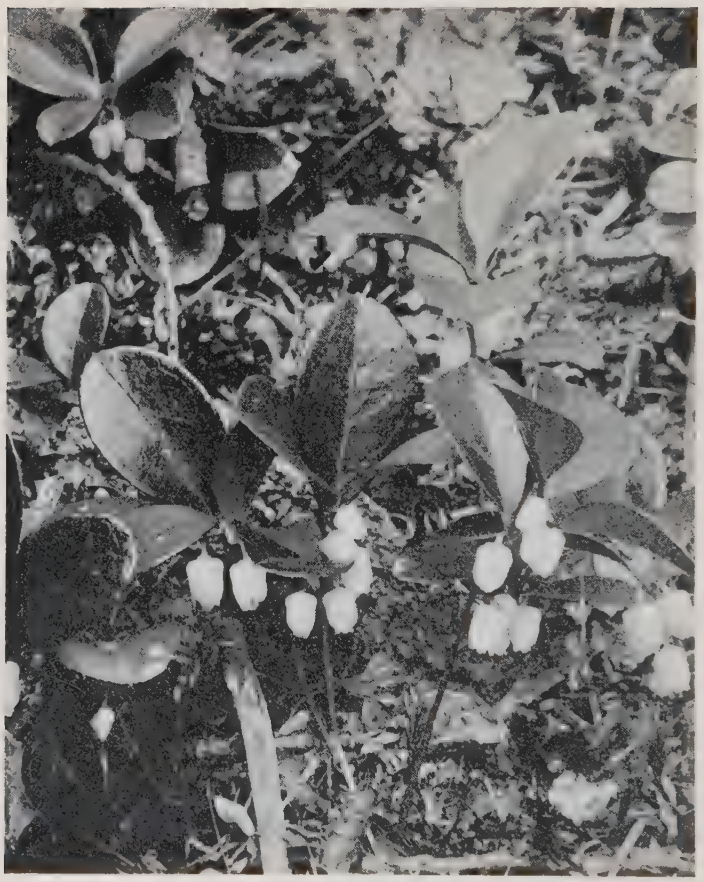


FIG. 25. CHECKERBERRY (*Gaultheria procumbens*)

4. ARCTOSTAPHYLOS Adans. Bearberry

Shrubs, trailing or depressed with some upright branches, and alternate leaves; flowers in scaly-bracted terminal racemes or clusters; corolla with a short revolute 5-toothed limb.

1. **A. Uva-ursi** (L.) Spreng. var. **coactilis** Fernald & Macbr. Often rooting at the branches; bark flaking off, reddish brown; leaves ever-

green, thick, broadly ovate, rounded at the apex, narrowed at base; inflorescence an axillary or terminal cluster of 1-6 flowers on short reflexed peduncles; corolla the shape of a truncated cone, small, white, with purplish lobes; fruit bright cherry-red, with thin astringent pulp and usually 5-ridged, rugose nutlets.—A very common plant, characteristic of open sand on the high dunes, and sometimes found on sandy ridges in the northern Calumet District. Flowers in May and June; fruit in July and August.

5. GAYLUSSACIA HBK. Huckleberry

Branching shrubs, resembling the blueberries (*Vaccinium*), with lateral bracted racemes of flowers, the corolla tubular, ovoid, or bell-shaped with 5-cleft border; anthers awnless; cells tapering upward into more or less of a tube; fruit a berry-like drupe.

1. **G. baccata** (Wang.) C. Koch. (*Black Huckleberry.*) Erect shrub 3-15 dm. tall, with more or less pubescent branch tips; leaves oblong, oval, obovate or oblanceolate, with entire and ciliate margins, green and glabrous from the first, but with resinous dots below; the short racemes 1-7-flowered, mostly on the old wood; corolla small, reddish or pinkish; fruit about 8 mm. thick, black, dull or with a slight bloom. (*G. resinosa* T. & G.)—An edible-fruited species, found locally in woods of the dune region. Flowers in May and June, fruit from July-September. Hill has reported from the dunes a light rose-colored fruit (perhaps only immature).

6. VACCINIUM L. Blueberry

Erect shrubs with clustered or racemed flowers, the corolla cylindraceous or campanulate; stamens 10.

Shrubs a meter or more tall.	
Leaves half grown at flowering time, in maturity glabrous or nearly so beneath; corolla white or pinkish......	*V. corymbosum* 1.
Leaves unexpanded at flowering time, in maturity woolly beneath; corolla greenish and reddish.............	*V. atrococcum* 4.
Shrubs less than a meter tall.	
Leaf margins serrulate................................	*V. pennsylvanicum* 2.
Leaf margins entire..................................	*V. vacillans* 3.

1. **V. corymbosum** L. (*Highbush Blueberry.*) Leaves elliptic-lanceolate, sometimes ovate and oblanceolate, and oval, narrowed at base, tapering to apex, entire or serrulate, often obscurely so, more or less pubescent below; racemes short, 3-8-flowered; fruit blue-black, mostly with a thick bloom, 7-10 mm. in diameter.—In acid soils, especially around peaty bogs and lakes, forming dense thickets, Miller to Mineral Springs and eastward. Flowers in May, fruit in July. The following variations have been recognized at Miller by Hill:

(a) With ciliate-serrulate leaves, pubescent, mainly on the veins beneath, pale, especially beneath, and sometimes glomerate-ciliate.

(b) With leaves nearly or quite entire, margins ciliate, smooth, or occasionally pubescent on the midrib beneath, longer, green and glossy on both sides, when young, pubescent in lines.

(c) Leaves serrate-crenate, without cilia, smooth.

Var. **amoenum** (Ait.) Gray. Similar to the typical form, the leaves bright green on both sides, ciliate-serrulate or bristly ciliate, or quite without cilia.—Miller, perhaps elsewhere.

Var. **pallidum** (Ait.) Gray. Glaucous, the leaves whitened beneath, ciliate-serrulate.—Miller, perhaps elsewhere.

Var. **glabrum** Gray. With leaves entire, except with slight tendency to be serrulate at the tip in some cases, smooth, pale beneath, green and glossy above.—Miller, perhaps elsewhere.

2. **V. pennsylvanicum** Lam. (*Lowbush Blueberry.*) 2.5-5 dm. tall; branches and branchlets wrinkled, yellowish green, pubescent at least in lines; leaves oblong-lanceolate to lanceolate, spatulate or elliptic, acute, narrowed at base, the margin sharply serrulate, sparingly pubescent on both surfaces at first, finally smooth or nearly so; racemes short, about 5-flowered, the corolla green, or greenish bordered with red, cylindric-urn-shaped; fruit oblate-spheroid, 9-15 mm. thick, with a bloom, sweet, edible.—The commonest blueberry of the dune woods and oak barrens of the Calumet District. Flowers in May, fruit in July.

Hill has reported the following variations from Hammond:

(a) Leaves glaucous; fruit black, without a bloom, somewhat depressed-globular; usually taller than the type.

(b) 20-40 cm. high; leaves of a larger form, glaucous; flowers tinged red.

(c) Same stature; leaves glaucous, narrow, flowers as in (b).

Var. **nigrum** Wood. (*Low Black Blueberry.*) Leaves blue-green, glaucous beneath, firmer; berries black, without bloom.—Hammond, according to Hill; more frequent in the high dune country.

3. **V. vacillans** Kalm. (*Late Low Blueberry.*) Branchlets wrinkled, yellow-green; leaves oval and obovate or ovate, lanceolate or nearly round, margins ciliate-serrulate, rarely entire or toothed only at the apex at maturity and glabrous above, glaucous but sometimes pubescent; racemes short, 5-12-flowered, with green or reddish calyx and greenish yellow corolla; fruit about 8 mm. thick, blue-black, generally with a dense bloom, rarely without.—Frequent throughout in dune woods and oak barrens. Flowers in June, fruit in September.

4. **V. atrococcum** (Gray) Heller. (*Black Highbush Blueberry.*) Resembling *V. corymbosum;* corolla turgid-ovoid to ellipsoid, 5-8 mm. long; berries 5-8 mm. thick, polished black, without a bloom.—On bogs at Miller and Mineral Springs. Flowering and fruit a week or ten days earlier than *V. corymbosum*, with which it is associated.

7. OXYCOCCUS Hill. Cranberry

Our species low, creeping or trailing, slender-stemmed plants with small, entire, evergreen leaves and axillary or terminal flowers nodding on long filiform pedicels, the corolla deeply cleft or parted, with linear reflexed lobes and exserted anthers.

1. **O. macrocarpon** (Ait.) Pursh. Stems comparatively stout, elongated, with ascending flowering branches; leaves oblong-elliptic, blunt or rounded at tip; pedicels 1-10, springing from an elongated rachis terminating in a leafy shoot; flowers rose-color; berry bright red, acidulous but edible, 1-2 cm. in diameter. (*Vaccinium* Ait.)—Sphagnum bogs, Miller, Mineral Springs, Tamarack Sta. and Furnessville. Flowers in summer, fruit in autumn.

PRIMROSE FAMILY (Primulaceae)

Herbs with simple leaves and regular perfect flowers, the stamens opposite to and as many as the lobes of the corolla which is regularly formed of united petals, but sometimes of wholly or nearly separate petals; ovary 1-celled, free from the calyx or partly adherent in *Samolus*; stamens 4 or 5, rarely 6 or 8; style or stigma one.

Corolla and calyx with reflexed segments..................	*Dodecatheon* 5.
Corolla with erect or spreading segments.	
Corolla and calyx 7-parted............................	*Trientalis* 4.
Corolla and calyx 5-6-parted.	
Corolla bell-shaped................................	*Samolus* 1.
Corolla wheel-shaped, almost tubeless.	
Staminodia (aborted stamens) none................	*Lysimachia* 2.
Five slender staminodia between the fertile stamens..	*Steironema* 3.

1. SAMOLUS L. Brookweed

Smooth herbs with alternate entire leaves and small flowers, in racemes or panicles of racemes; calyx 5-cleft; corolla 5-cleft; true stamens 5, on the corolla tube, included; fruit a 5-valved globose capsule with many seeds.

1. **S. floribundus** HBK. (*Water Pimpernel.*) Slender, diffuse, 1.5-3 dm. tall; leaves membranous, obovate; pedicels long and spreading; flowers white. (*S. parviflorus* Raf.; *S. Valerandi* var. *americanus* Gray.)—Occasional in mud or shallow water of the Calumet District; ditches, Mineral Springs.

2. LYSIMACHIA L. Loosestrife. Swamp Candles

Leafy-stemmed perennials with mostly opposite or whorled glandular-dotted foliage and solitary, racemose, paniculate or corymbose yellow flowers, the calyx 5-6-parted as is the corolla; fruit a few-several-seeded capsule.

Stamens joined at the base; corolla pure yellow...........	*L. terrestris* 1.
Stamens free at the base; corolla purplish-dotted.........	*L. thyrsiflora* 2.

1. **L. terrestris** (L.) BSP. 2-8 dm. tall, smooth, at length branched, very leafy; leaves opposite or rarely alternate, acute at each end, lanceolate; flowers on slender pedicels in a bracted raceme; corolla lobes long and slender; bulblets frequently occur in the axils of the stem, which fall to the ground and reproduce parthenogenetically.—In shallow water, grassy swales and along edges of sloughs and in mud, frequent among the true dunes. June-August.

2. **L. thyrsiflora** L. Stem simple, 2.5-10 dm. tall; all but the lower leaves lanceolate, these reduced to scales; the 1-4 middle pairs of leaves bearing in their axils short-peduncled head-like or spike-like clusters of light yellow flowers with purplish dots; sinuses of the corolla sometimes bearing teeth. (*Naumburgia* Duby; *Nummularia* Kuntze.)—Local, in water, mud, bogs, and sloughs, Wolf Lake, East Chicago, Miller. June, July.

3. STEIRONEMA Raf.

Leafy-stemmed perennials, glabrous except the ciliate petioles, the leaves all opposite, not punctate-dotted, mostly whorled on the flowering branches; peduncles axillary, slender, the flowers yellow; petals tipped with a slender point, more or less finely or irregularly toothed; fruit a 10-20-seeded capsule.

Stem leaves sessile.................................... *S. quadrifolium* 3.
Stem leaves petioled.
  Petioles ciliate, not winged; leaves heart-shaped or rounded at base.................................... *S. ciliatum* 1.
  Petioles at least of the upper leaves short, margined; leaves narrowed to the base.......................... *S. lanceolatum* 2.

1. **S. ciliatum** (L.) Raf. 3-12 dm. tall, the leaves broadly ovate to ovate-lanceolate, tapering to an acute tip, 5-13 cm. long.—In low rich woods along Dune Creek, also Clarke and Michigan City. June-August.

2. **S. lanceolatum** (Walt.) Gray. Stem erect or sometimes reclined and rooting at the joints; leaves 4-10 cm. long, lanceolate or the lowest, on long petioles, short and broad.—In damp sandy thickets and dune swales, Dune Park to Michigan City and beyond. June-August. Mrs. Chase has noted from our area a plant bearing flowering peduncles from every axil except the lowest, and a creeping stoloniferous shoot borne from the first node underground.

Var. **hybridum** (Michx.) Gray. Stem leaves oblong.—Tremont.

3. **S. quadrifolium** (Sims) Hitchc. Stem 2-9 dm. tall, 4-angled, often branched below; stem leaves long and narrow, 3-9 cm. long, smooth, shining, rather rigid, obtuse, the margins often revolute, the veins obscure; lowest leaves spatulate or oblong.—Moist prairies of the Calumet District and in a marsh at Mineral Springs. July.

4. TRIENTALIS L. Star Flower

Low smooth perennials with erect simple stems bearing a few alternate and usually scale-like leaves below and a whorl of veiny thin leaves at the summit; peduncles one or more, slender, bearing a single delicate star-shaped flower; corolla wheel-shaped and nearly without a tube; filaments slender, united in a ring at the base; anthers revolute after flowering; fruit a few-seeded capsule.

1. **T. borealis** Raf. Rootstock horizontal or creeping, slender; sometimes producing long stolons from the upper axils; stems erect, 7-25 cm. tall; leaves tapering at both ends, long and narrow; flowers white, the petals finely pointed. (*T. americana* Pursh.)—In wet thickets, and on the edges of bogs especially under Nyssa, from Miller eastward through the dune country. May-July.

5. DODECATHEON L. Shooting Star

Smooth perennial herb with fibrous roots and leaves all in a basal rosette, the stem naked but with a small involucre of bracts at the summit, bearing a loose umbel of showy flowers nodding on slender pedicels; calyx deeply 5-cleft; corolla with very short tube and thickened throat, the divisions long and narrow; filaments short, more or less united at the base; anthers long and narrow, converging and forming a slender cone.

1. **D. Meadia** L. Perennial by a stout rootstock; stem 2-6 dm. tall; leaves spatulate or oblong, gradually narrowed to the base; corolla purple, pink, or white; pedicels nodding in flower, erect in fruit.—A beautiful fragrant flower of the Calumet District prairies. May, June.

OLIVE FAMILY (Oleaceae)

Trees or shrubs with opposite leaves and a regular 4-cleft or obsolete calyx and petals none or 4; stamens 2-4; ovary 2-celled.

Leaves pinnate; fruit a samara	*Fraxinus* 1.
Leaves simple; fruit a capsule	*Syringa* 2.

1. FRAXINUS L. Ash

Timber trees with petioled leaves and small flowers in crowded panicles or racemes from the axils of last year's leaves; flowers with sexes, at least in some of the flowers, separate, sometimes on different trees; calyx nearly obsolete; petals mostly absent in our species; stamens 2, rarely 3 or 4; style single; fruit a samara with one wing.

Bark of mature trees deeply fissured; fruit not winged to the base.	
Wing of fruit rarely extending down on the body more than ⅓ of its length; body of fruit thick, round and rather abruptly passing into the wing	*F. americana* 1.
Wing of fruit generally extending down on the body more than ⅓ of its length; body of fruit flattened and gradually passing into the wing	*F. pennsylvanica* 2.
Bark of mature trees scaly or flaky; fruit winged to the base	*F. nigra* 3.

1. **F. americana** L. (*White Ash.*) Bark gray, or on the branches grayish green, first shoots of the season bright green, becoming brown at the end of the summer; winter buds broadly ovate, obtuse, with 4

pairs of scales, appearing rusty-pubescent; leaflets 5-9, usually 7, 5-13 cm. long, ovate to narrow-oblong, entire or somewhat toothed, long-taper-pointed, deep green and smooth above, pale beneath and silvery; fruit 3-5 cm. long with plump round body, the wing somewhat wider and 3 times as long.—In the richer dune woods at the base of high dunes, and in prairie thickets. Spring.

2. **F. pennsylvanica** Marsh. (*Gray Ash.*) Bark dark gray, that of the year's shoots greenish-gray; buds small and black; leaflets similar to the preceding, but not silvery beneath; flowers appearing with the leaves; the edge of the fruit body gradually tapering into a wing which is 1-5 times as long as the body and extends down along the body to the middle or below it.—This tree has been reported from the region of Berry Lake, Lake Co., but is probably extinct there; it has also been reported from Porter Co., and is to be expected elsewhere in our area but it can not be certainly stated to be present. Spring.

3. **F. nigra** Marsh. (*Black Ash, Swamp Ash.*) Bark light gray; branches small, light gray, rather tough, the new year's shoots olive green, becoming smooth and gray; winter buds robust, with 3 pairs of scales, velvety black; leaflets 7-13, usually 9, dark green above, pale beneath; flowers appearing before the leaves; both calyx and petals none; fruit 2-3 cm. long, linear-oblong, broadest above the middle, round at both ends, flat or slightly twisted.—In woods along Dune Creek and near Furnessville and Tamarack Sta. Spring.

2. SYRINGA L. Lilac

Shrubs with entire leaves and funnelform corolla with short spreading lobes; capsules leathery and scurfy-scaly, each cell containing 2 winged seeds.

1. **S. vulgaris** L. Leaves glabrous, ovate, truncate to subcordate; flowers lilac or white, in lateral panicles, fragrant.—Intr. from Eu. and escaped cult. near farms and towns, even on dunes.

GENTIAN FAMILY (Gentianaceae)

Smooth herbs with a colorless bitter juice, the leaves without stipules; flower regular; stamens as many as the corolla lobes; corolla withering-persistent, with the stamens inserted on its tube; calyx persistent; ovary 1-celled; fruit usually a many-seeded, 2-valved capsule.

- Leaves always simple and entire, sessile, never alternate.
  - Leaves all reduced to small scales; flowers on long slender pedicels, yellowish white, 4-parted; corolla lobes imbricated in bud.............................. *Bartonia* 4.
  - Leaves, at least part of them, normal, with broad blades; corolla lobes convolute in bud.
    - Style filiform, usually deciduous; anthers twisting in age; corolla pink.

Corolla lobes a little more than one-half as long as the tube; flowers small and salverform; anthers twisting spirally	*Centaurium* 2.
Corolla lobes several times longer than the tube; flowers wheel-shaped, relatively large	*Sabatia* 1.
Style short or none; stigmas 2, persistent; corolla often bearing intermediate teeth, funnelform or bell-shaped, blue, white, or greenish	*Gentiana* 3.
Leaves all alternate and petioled, trifoliate	*Menyanthes* 5.

1. SABATIA Adans. Rose-pink

Stems slender, bearing panicled cymes of handsome flowers, with 5-12-parted calyx, the lobes slender; corolla 5-12-parted, wheel-shaped, divided almost to the base; anthers of the 5-12 stamens recurving; style 2-cleft or -parted and slender.

1. **S. angularis** (L.) Pursh. Stem 4-angled and somewhat winged, 3-6 dm. tall; leaves ovate, heart-shaped-clasping, 5-nerved; flowers sparse on the panicled branches; corolla 4-parted, rose pink with a yellowish center.—A beautiful little plant common in dune meadows; occasional on sand plains of the Calumet District. July, August.

2. CENTAURIUM Hill. Centaury

Low, branching annuals, with 4-5-parted calyx, the lobes narrow; corolla funnelform or salverform with slender tube and 4-5 lobes; anthers erect, exserted.

1. **C. pulchellum** (Sw.) Druce. 0.5-3 dm. tall; stem repeatedly forked above and forming a loose cyme; leaves oval or ovate-oblong (specimens from our area show some with ovate-orbicular leaves); pedicels shorter than the calyx; corolla pink, with lobes 3-5 mm. long, and tube thrice as long. (*Erythraea* Fries.)—A pretty little plant, nat. from Eu., and occurring sporadically on limy soils of the Calumet District. Summer.

3. GENTIANA L. Gentian

Flowers solitary or cymose, with a 4-5-lobed corolla, the lobes often alternating with plaited folds which bear petal-like appendages, these sometimes actually larger than the true corolla lobes; stamens inserted on the corolla tube; style short or none, with 2 persistent stigmas; fruit a 2-valved capsule containing many seeds.

Flowers solitary; corolla fringed; lobes 4, the sinuses without teeth; annuals.	
Leaves lanceolate or ovate-lanceolate; lobes of the calyx ovate and lanceolate, smooth on the back; lobes of the corolla wedge-obovate; ovary lanceolate	*G. crinita* 6.
Leaves linear; lobes of the calyx linear-lanceolate or lance-triangular; lobes of the corolla roundish; ovary elliptical	*G. procera* 5.
Flowers generally more than 1; corolla not fringed; lobes 5, their sinuses with petaloid teeth; perennials.	

- Leaves with smooth margins.......................... *G. flavida* 1.
- Leaves with rough margins.
  - Stem rough.. *G. puberula* 4.
  - Stems smooth.
    - Calyx lobes erect, equalling or exceeding the tube and half as long as the corolla; teeth in the sinuses of the corolla exceeded by the true lobes...... *G. Saponaria* 3.
    - Calyx lobes reflexed, shorter than the tube, and much shorter than the corolla; teeth in the sinuses of the corolla as large as the true lobes.......... *G. clausa* 2.

1. **G. flavida** Gray. (*Green Gentian.*) Stem stout, 3-9 dm. tall; leaves with a clasping base, ovate-lanceolate, gradually tapering; flowers sessile and crowded in a dense terminal cluster; calyx lobes reflexed, much shorter than tube of the greenish-white corolla; corolla at first closed and club-shaped, at length open, its lobes twice the length of the teeth in the sinuses. (*Dasystephana* Small.)—Locally in sandy woods of the Calumet District, and the southwestern prairie district, sometimes eastward through the true dunes to Mineral Springs. September, October.

2. **G. clausa** Raf. (*Closed* or *Bottle Gentian.*) Leaves ovate-lanceolate from a narrowed base; calyx lobes reflexed; corolla blue with white plaits, or all white (forma *albiflora* House), closed, club-shaped. (*G. Andrewsii* Griseb.; *Dasystephana Andrewsii* Small; *Dasystephana clausa* Heller.)—A beautiful species, rare from Tremont to and beyond Michigan City. September, October.

3. **G. Saponaria** L. (*Soapwort Gentian, Harvest Bells.*) Similar to the preceding (see key); corolla bright blue, lobes erect or converging but not wholly closed. (*Pneumonanthe* S. W. Schmidt, *Dasystephana* Small.)—A very pretty species; the sap forms suds in water; once common around Gary; now rare there; it is found in a few localities in low meadows of the true dunes. September, October.

4. **G. puberula** Michx. (*Downy Gentian.*) Stems 1.5 dm. tall; leaves rigid, linear-lanceolate, 2-7 cm. long; flowers clustered; calyx lobes much shorter than the bell-shaped open bright blue corolla; corolla lobes twice or thrice the length of the teeth of the sinuses which are cut-toothed. (*Pneumonanthe* Greene; *Dasystephana* Small.)—A pretty species, on prairies along the Calumet, rather rare. October.

5. **G. procera** Holm. (*Fringed Gentian.*) Stems 1.5-5 dm. high, the basal leaves spatulate; calyx lobes unequal. (*G. detonsa* Torr.)—A pretty species with sky-blue corolla, found in moist grounds around Pine and Clarke, especially prairies bordering the Calumet River and rare on the bog at Mineral Springs. September.

6. **G. crinita** Froel. (*Fringed Gentian.*) Stem 1-9 dm. tall; similar to the preceding (see key); corolla deep purple, blue, or sometimes pure white (forma *albina* Fernald). (*Gentianella* Bercht. & Presl; *Anthopogon* Raf.)—Our most beautiful gentian; in low meadows, Pine, bank of the Calumet at Clarke, slough borders, Miller and Dune Park, meadows among the high dunes. September, October.

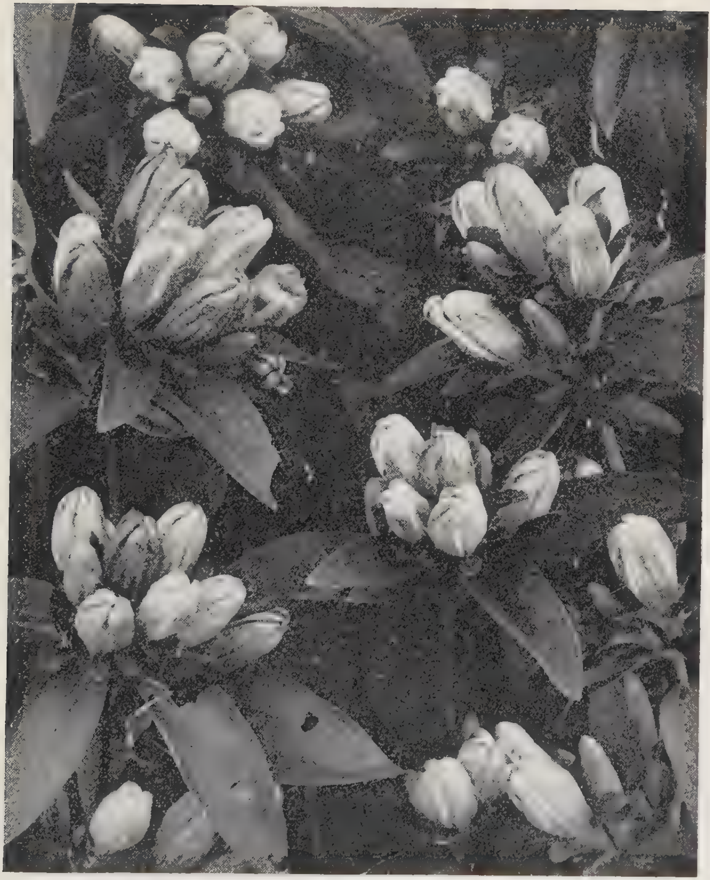


FIG. 26. SOAPWORT GENTIAN (*Gentiana Saponaria*)

4. BARTONIA Muhl. Screwstem

Small annuals or biennials with thread-like stems and little awl-shaped scales replacing the leaves; flowers peduncled, small, with short stamens; stigma 2-lobed, persistent; capsule flattened, oblong.

1. **B. virginica** (L.) BSP. Stems 5-30 cm. tall, yellowish, angled, rather rigidly erect and simple or forked from the hard, half-woody base; scales numerous; branches opposite, 1-few-flowered; flowers

yellowish white, the lobes oblong, denticulate.—In dune swales, on wooded hillsides and in Nyssa woods, Miller, Dune Park, Port Chester, Tamarack Sta., also Clarke, and in Nyssa woods. July-September.

5. MENYANTHES L. Buckbean

Perennials with thick creeping rootstocks sheathed by the membranous bases of the long petioles; leaves chiefly basal; flowers racemed on the naked stem; calyx 5-parted, the corolla short-funnelform, 5-cleft, bearded inside, white; style slender, persistent; stigmas 2-lobed; capsule many-seeded, bursting irregularly; seeds shining.

1. **M. trifoliata** L. Flowers white or slightly reddish.—In bogs and shallow water, rare, Clarke, Tamarack Sta., and Miller. April-June.

DOGBANE FAMILY (Apocynaceae)

Plants with milky juice and entire, chiefly opposite leaves without stipules, and regular 5-merous flowers; stamens 5, inserted on the corolla; pollen glandular; calyx free from the 2 distinct ovaries which form 2 follicles (pods) in fruit, but have their styles or stigmas united into one; seeds often silky-tufted.

1. APOCYNUM L. Dogbane

Perennial herbs with tough fibrous bark and mucronate-pointed leaves, the corolla bell-shaped, bearing 5 triangular appendages below the throat opposite the lobes; style none; stigma large; fruit of 2 long slender pods containing silky-tufted seeds; flowers cymose. Plants poisonous.

- Corolla pink or white with pink stripes, 4-10 mm. long, with more or less spreading lobes; calyx much shorter than the corolla tube.
  - Corolla bell-shaped, with prominently flaring lobes .... *A. androsaemifolium* 1.
  - Corolla short-tubular, or jug-shaped, its lobes but slightly flaring .... *A. medium* 2.
- Corolla greenish to greenish white, tubular, 3-4.5 mm. long, its lobes chiefly erect; calyx approaching or equalling the corolla tube in length.
  - Leaves and cymes glabrous or pubescent.
    - Principal stem leaves (not those of the branches) narrowed to distinct petioles .... *A. cannabinum* 3.
    - Principal stem leaves rounded or subcordate at base, and very shortly petioled or subsessile .... *A. cannabinum* var. 3b.
  - Whole plant including the cymes densely velvety white-pubescent .... *A. cannabinum* var. 3a.

1. **A. androsaemifolium** L. Stems 3-5 dm. tall, widely and loosely branching above with dichotomous ascending branches; leaves ovate to ovate-oblong, slender-pointed, mostly drooping, dark dull green above, pale and pubescent beneath; flowers nodding, fragrant; all cymes flowering at the same time.—Common throughout in shrubby thickets. June-August.

2. **A. medium** Greene. Branches ascending or spreading; leaves firm; inflorescences either terminal or at the tips of branches; central cyme flowering first.—An intermediate species of rather vague definition, reported by Umbach (acc. to Pepoon) from Miller. Summer.

3. **A. cannabinum** L. (*Indian Hemp.*) 5-20 dm. tall, either erect, with ascending branches or, under adverse ecological conditions, sprawling; leaves thin, ascending, pale green, oblong, lanceolate-oblong or ovate-oblong, the veins acutely ascending, the tips somewhat acuminate; leaves on the branches sometimes subsessile; cymes dense, the central the first to flower; flowers chiefly erect.—Shores of lakes, in thickets, on gravel beaches, along roadsides and railroad tracks, locally abundant at least within two miles of Lake Michigan. Summer.

3a. Var. **pubescens** (R. Br.) DC. (*A. pubescens* Ait.)—In sand at Miller and probably elsewhere. *A. cinereum* Nieuwland, described as an endemic from Miller, does not differ in description from this variety.

3b. Var. **hypericifolium** (Ait.) Gray. 3-6 dm. tall, glabrous and often glaucous, with erect, oblong, oblong-lanceolate, or oval leaves, the tip abruptly acute, the blade broadest near the base, the veins at a wide angle to the midrib. (*A. hypericifolium* Ait.)—Roadsides and thickets, range of the species.

MILKWEED FAMILY (Asclepiadaceae)

Plants usually with milky juice, and opposite or whorled or sometimes alternate entire leaves, with regular, perfect, 5-merous flowers and 5 stamens, the anthers connected with the stigma, the pollen cohering in waxy masses, the ovaries 2, forming in fruit 2 follicular pods with mostly silky-tufted seeds.

Corolla reflexed, deeply 5-parted; stamen tube surmounted by a crown of 5 fleshy bodies each with an incurved horn rising from the cavity of each hood............	*Asclepias* 1.
Corolla reflexed or merely spreading; crown without a horn. .	*Acerates* 2.

1. ASCLEPIAS L. Milkweed

Perennial herbs with mostly opposite leaves; peduncles terminal or lateral, bearing simple many-flowered umbels of flowers; calyx persistent, small, divisions reflexed; stamens 5, inserted on the base of the corolla, the filaments united into a tube which encloses the pistil; anthers bearing the pear-shaped waxy pollen masses which form pairs from adjacent anthers and hang by a slender prolongation to the 5 cloven glands growing on the angles of the stigma; ovaries tapering into 2 short styles, a single stigmatic disk common to both; follicles 2, one abortive; seeds flat.

Insects extricate the pollen masses from the flowers and carry the whole pellet about attached to their bodies, as in the case of orchids.

Leaves alternate; juice not milky; flowers orange-colored....	*A. tuberosa* 1.
Leaves mostly opposite; juice mostly milky; flowers not orange.	

Leaves 3-6 in a whorl.................................. *A. verticillata* 8.
Leaves not whorled.
Corolla bright red or rose-purple.
Flowers large; hoods about 6 mm. long, exceeding the anthers; leaves transversely veined........... *A. purpurascens* 3.
Flowers small; hoods 2-3 mm. long, equalling the anthers; veins ascending....................... *A. incarnata* 2.
Flowers greenish, whitish, or at most a faint dull reddish or purplish.
Leaves clasping by a heart-shaped base............. *A. amplexicaulis* 6.
Leaves short-petioled or nearly sessile, not clasping.
Plants canescent or tomentose................... *A. syriaca* 4.
Plants glabrous or minutely pubescent.
Corolla greenish............................ *A. phytolaccoides* 7.
Corolla purplish............................ *A. Sullivantii* 5.

1. A. **tuberosa** L. (*Butterfly-weed, Pleurisy-root.*) 3-9 dm. tall, rough-hairy; stems ascending or decumbent, very leafy, branching at the summit, bearing umbels in a terminal corymb or scattered in racemes along the branches; leaves oblong-ovate to linear, sessile or slightly petioled; corolla greenish-orange, the hoods bright orange; pods on deflexed pedicels, hoary.—Common in dunes and sandy fields throughout. June, July.

2. A. **incarnata** L. (*Swamp Milkweed.*) 5-10 dm. tall, smooth or nearly so, very leafy, with two downy lines above, and on the peduncle branches; leaves obscurely heart-shaped or narrowed at base, oblong-lanceolate; flowers rose-purple, rarely whitish; pods erect, sparingly puberulent.—In low wet ground, Wolf Lake, Clarke, and in dune meadows. July, August.

Var. **pulchra** (Ehrh.) Pers. Leaves broader; flowers paler.—Occasional with the species.

3. A. **purpurascens** L. (*Purple Milkweed.*) 1 m. or less tall, rather slender, the leaves minutely velvety-downy underneath, taper-pointed, contracted to a short petiole, elliptical or ovate-oblong; corolla dark purple; flowers 1.5 cm. long; pods erect, downy.—In low open woods from Clarke to Tremont and perhaps more widely distributed. June, July.

4. A. **syriaca** L. (*Common Milkweed.*) 9-15 dm. tall, stout, finely soft-pubescent; leaves 1-2 dm. long, minutely downy beneath, broadly oval or lance-oblong; corolla mauve or dull purple to white; pods erect on deflexed pedicels, downy, softly spinous; umbels large, terminal and lateral. (*A. Cornuti* Dcne.)—The commonest milkweed of the dunes; it is abundant close to the shore of Lake Michigan. June-August.

5. A. **Sullivantii** Engelm. Very smooth throughout, tall; leaves somewhat heart-shaped at base, nearly sessile, ovate-oblong; flowers 1.5-2 cm. long, larger than in the preceding species, more purplish; umbels large; pods erect on deflexed peduncles, nearly glabrous, spiny chiefly on the beak.—A prairie species, found along roadsides near Aetna, and to be looked for elsewhere in the Calumet District, also meadows of Mineral Springs. June, July.

6. A. **amplexicaulis** Sm. 3-8 dm. tall, glabrous and pale or glaucous; leaves very obtuse or notched at apex, transversely veined, wavy;

corolla pale greenish-purple; umbel solitary on a long naked terminal peduncle, a second umbel sometimes occurring at the base; pods not spiny, borne erect on recurved pedicels. (*A. obtusifolia* Michx.)—In sandy ground, Miller, Clarke, and rare on wooded dunes. June, July.

7. **A. phytolaccoides** Pursh. 5-15 dm. tall, glabrous or with some minute pubescence on young parts; leaves large, pointed at both ends, broadly ovate or the upper oval-lanceolate, short-petioled, smooth or slightly downy beneath; lateral umbels several; pedicels loose and numerous, nodding, as long as the peduncle itself; corolla greenish, hoods white; pods erect on decurved pedicels, not spiny. (*A. exaltata* Muhl.)—In sandy woods, Clarke, and rare on wooded dunes. June-August.

8. **A. verticillata** L. 3-9 dm. tall, from a fibrous root, leafy to the summit, the leaves narrowly linear to filiform, with revolute margins; umbels small, lateral and terminal; corolla greenish-white; pods and pedicels erect.—One of the commonest plants of the oak woods, throughout, also on prairies. August, September.

2. ACERATES Ell. Green Milkweed

Similar to *Asclepias* (see key), the flowers greenish, in compact many-flowered umbels; pods not spiny; pollen masses slender-stalked.

Leaves mainly alternate; crown upon a column shorter than the globular mass of anthers and stigmas............	*A. floridana* 1.
Leaves mainly opposite; crown sessile, the oblong hoods nearly equalling the anthers......................	*A. viridiflora* 2.

1. **A. floridana** (L.) Hitchc. About a meter or less tall, minutely roughish-hairy or smoothish; leaves lanceolate to linear; umbels terminal or lateral, few, on peduncles twice the length of the slender pedicels. (*A. longifolia* Ell.)—Prairies of the Calumet Region and rare in dune meadows. June-September.

2. **A. viridiflora** Ell. 3-8 dm. tall; stems ascending, minutely soft-downy, becoming smooth; leaves oblong to oval, thick; umbels dense, globose, lateral, nearly sessile.—Frequent on prairies of the Calumet District, also the pine barrens and Miller to Tremont. June-September.

Var. **lanceolata** (Ives) Gray. Leaves 6-10 cm. long, lanceolate. (Var. *Ivesii* Britton.)—Frequent with the species.

CONVOLVULUS FAMILY (Convolvulaceae)

Mostly twining or trailing herbs, often with some milky juice, and with alternate leaves or scales and regular flowers, the calyx of 5 overlapping sepals, the corolla of 5 united petals, the ovary 2-3-celled, becoming 4-angled; fruit a globular, 2-6-seeded capsule.

Leafy, green plants.	
Stigma 1, capitate or globose.........................	*Ipomoea* 1.
Stigmas 2, filiform to oblong.........................	*Convolvulus* 2.
Leaves none, replaced by scales; plants yellowish or orange, devoid of chlorophyll; parasites without true roots...	*Cuscuta* 3.

1. IPOMOEA L. Morning Glory

Twining herbs with a funnelform or bell-shaped corolla, the calyx not bracteate, the outer sepals commonly larger; corolla lobes almost none; capsule globular, 4-6-seeded, 2-4-valved. Our species annuals with heart-shaped, petioled leaves; stigma 3-lobed; sepals long and narrow.

Leaves 3-lobed	*I. hederacea* 1.
Leaves entire	*I. purpurea* 2.

1. **I. hederacea** Jacq. Low-trailing; stem rather short, retrorsely hairy; peduncles shortish, 1-3-flowered; calyx densely hairy below; corolla relatively small, 3-4.5 cm. long, pale blue, white or purple. (*Pharbitis* Choisy.)—Intr. from trop. Asia and nat. in fields and by roads. Summer.

2. **I. purpurea** (L.) Roth. (*Common Morning Glory.*) Long-trailing or high-climbing, with retrorsely hairy stems and long, umbellately 3-5-flowered peduncles; calyx bristly-hairy below; corolla funnelform, rather large, 4.5-7 cm. long, purple, rose, or white. (*Pharbitis* Voigt.)—Intr. from trop. Asia and nat. around towns and farms. Summer.

2. CONVOLVULUS L. Bindweed

Herbaceous vines or rarely erect, with funnelform to bell-shaped corolla and included stamens, the capsule globose, 2-4-valved.

Calyx enclosed in two broad leafy bracts; stigmas oval to oblong.	
Erect; petioles at most one-fourth as long as the leaf-blades	*C. spithamaeus* 1.
Twining or trailing; petioles longer	*C. sepium* 2.
Calyx not bracted; stigmas filiform	*C. arvensis* 3.

1. **C. spithamaeus** L. Stem low, simple, upright or ascending, 1.5-3 dm. tall, downy; leaves broadly oblong with or without a heart-shaped, auricled base; corolla white, showy, 4-5 cm. long; stigma oval. (*Calystegia* Pursh.)—Rare, in dry open sandy soil, the Calumet District. May-August.

2. **C. sepium** L. (*Hedge Bindweed.*) Practically glabrous; stem high-twining or extensively trailing; leaves triangular-halberd-shaped, the basal lobes obliquely truncate; peduncles 4-angled, elongated; corolla white or rose color, 3-5 cm. long. (*Calystegia* R. Br.)—Common in open ground, in sandy soil and around marshes, throughout, June-September.

Var. **pubescens** (Gray) Fernald. More or less pubescent, the stems 3-7 dm. long, sprawling; leaves cordate, oblong-ovate, the basal lobes obtuse or rounded.—Sandy soil, Calumet District.

3. **C. arvensis** L. (*Field Bindweed.*) Perennial with procumbent or twining stem; leaves ovate-oblong, halberd- or arrow-shaped, with acute basal lobes; peduncles 1-flowered; bracts minute, remote; corolla 1.5-2 cm. long, white or tinged with red.—Adv. from Eu., a weed along railroad tracks. June-August.

3. CUSCUTA L. Dodder

Plants which twine about other plants, sending into them minute sucking processes (haustoria); flowers cymose-clustered, white, fragrant, the calyx 4-5-cleft or of 5 separate sepals, the corolla globular-urn-shaped, bell-shaped, or short-tubular, with a spreading 4-5-cleft border; stamens with scale-like, often fringed appendages at base; ovary 2-celled, 4-ovuled, the styles mostly distinct; fruit a 4-seeded capsule.

- Flowers subtended by numerous bracts and ordinarily in a close, compact inflorescence.
  - Inflorescence dense, rope-like, tightly wound around the host; bracts acute with recurved tips............. *C. glomerata* 6.
  - Inflorescence less dense and not particularly rope-like; bracts obtuse, appressed........................ *C. compacta* 7.
- Flowers not subtended by bracts and ordinarily in a loosely clustered inflorescence.
  - Flowers commonly 4-parted.
    - Withered corolla remaining more or less persistent as a cap on the apex of the capsule; scale of the filaments well developed........................ *C. Cephalanthi* 3.
    - Withered corolla at the base of the capsule, deciduous; scales of the filaments obsolete.
      - Flowers fleshy; corolla lobes upright, the tips inflexed.. *C. Coryli* 4.
      - Flowers not as above............................ *C. Polygonorum* 1.
  - Flowers commonly 5-parted.
    - Capsules globose or depressed-globose, not pointed; corolla lobes reflexed, acute, with inflexed tips... *C. pentagona* 2.
    - Capsules ovoid or globose-pointed; corolla lobes upright or spreading, obtuse......................... *C. Gronovii* 5.

1. **C. Polygonorum** Engelm. Stems coarse, orange; calyx of united sepals; flowers 2-3 mm. long, white, the corolla persistent at the base of the capsule, its lobes often longer than the tube; scales of the filaments small, 2-cleft; capsule depressed-globose, thin, pale greenish-yellow. (*C. chlorocarpa* Engelm., *C. obtusiflora* HBK.)—On *Polygonum*, willows, *Aster*, *Euphorbia*, strawberries, etc. Miller and Dune Park. Summer.

2. **C. pentagona** Engelm. Similar to the preceding; stems low, slender, pale; flowers 1.5-2 mm. long, the calyx lobes broad, the corolla lobes acuminate, longer than the tube; scales of the filaments deeply fringed. (*C. arvensis* Beyrich.)—Probably overwintering in the crown of the host plants; on alfalfa, clover, and a variety of plants. Near the lake and throughout the high dune country.

3. **C. Cephalanthi** Engelm. Stem coarse, yellow, high-climbing; flowers 2 mm. long, on short thick pedicels; lobes of the calyx and corolla oblong, the calyx with united sepals, the corolla lobes shorter than the deep tube; scales of the filaments fringed. (*C. tenuiflora* Engelm.)—Common throughout, on *Cephalanthus* (button bush), willows, and composites. Summer.

4. **C. Coryli** Engelm. Stem coarse; flowers 2 mm. long; corolla with erect lobes, the tube deep; scales of the filaments reduced to a few

teeth; sepals united; corolla withering-persistent.—Dune hollows and prairies, growing on *Corylus* (hazel), *Euphorbia corollata*, etc. Summer.

5. **C. Gronovii** Willd. Stem coarse, high-climbing; sepals united; corolla with a deep bell-shaped tube and short lobes; scales of the filaments copiously fringed; capsule globose, bearing a stout projection in the center of the tip; corolla withering-persistent on the capsule.—A common species found throughout our area, on *Equisetum*, *Saururus*, *Eupatorium*, *Solidago*, *Sparganium*, willows, jewel-weed, etc. Summer.

6. **C. glomerata** Choisy. Stems stout, high-climbing; flowers much overlapped by papery oblong bracts with recurved tips; sepals similar to the bracts, shorter than the corolla tube, distinct from each other; styles capillary; scales of the filaments large, deeply fringed; capsule surmounted by the withering-persistent corolla.—Has been reported from the neighborhood of Whiting (H. & R.) on tall Compositae. The report is old and the station probably destroyed, but the species may well occur somewhere else in the region. Summer.

7. **C. compacta** Juss. Stems coarse; flowers closely sessile; sepals 5, surrounded by 3-5 bracts, roundish, concave, appressed, slightly crenate; corolla tube cylindrical, with oblong, obtuse, spreading lobes; stamens on short filaments, with large, deeply fringed scales; capsule capped by the withering-persistent corolla.—On shrubs, occasional, throughout. Summer.

PHLOX FAMILY (Polemoniaceae)

Herbs with alternate or opposite leaves and regular 5-merous flowers, the stamens on the corolla; ovary 3-celled and style 3-lobed; fruit a 3-celled, 3-valved capsule; seeds frequently mucilaginous and emitting spiral threads when moistened.

1. PHLOX L. Phlox

Mostly perennials with opposite, sessile, entire leaves, the floral sometimes alternate; flowers in cymes or panicles, mostly bracted, terminal or in the upper axils; calyx prismatic; corolla salverform, tube long; stamens included, unequally inserted. Albino forms may occur in almost any species.

- Lobes of the corolla cleft to or below the middle; flowers scattered or barely cymose........................ *P. bifida* 6.
- Lobes of the corolla entire or merely notched; flowers in cymes, corymbs, or panicles, not scattered.
  - Corolla pale lilac or bluish; plant producing leafy runners from the base.................................. *P. divaricata* 5.
  - Corolla pink, red-purple or white; plants not producing leafy runners from the base.
    - Leaves and stem distinctly hairy.
      - Inflorescence compact........................... *P. pilosa* 3.
      - Inflorescence rather loose........................ *P. argillacea* 4.
    - Leaves and stem essentially smooth.
      - Flowers few in loosely corymbed cymes; calyx teeth ⅓-½ as long as the tube................... *P. glaberrima* 2.

Flowers numerous in a narrowly ellipsoid panicle; calyx teeth less than ⅓ as long as the tube....	*P. maculata* 1.

1. **P. maculata** L. (*Wild Sweet-William.*) 3-9 dm. tall; stem rather slender, sometimes purple-spotted; leaves lanceolate below, ovate-lanceolate above, the base broad and heart-shaped, the apex tapering; panicle leafy below; corolla showy, pink-purple (or in forma *candida* Michx., white).—Rare in meadows among the high dunes or very rarely in rich grassy prairies of the Calumet District. Summer.

2. **P. glaberrima** L. 0.3-1. m. tall, slender; leaves linear-lanceolate or oblong-lanceolate, very smooth except the rough margins; cymes loosely corymbed, few-flowered; flowers peduncled, pink or white.—A prairie species, found on boggy meadows and in long grass of the Calumet District and east to Miller. Summer.

3. **P. pilosa** L. 2-5 dm. tall, slender, nearly erect, usually hairy on stem and lanceolate or linear leaves; cymes open; corolla small but bright pink, rose, or purplish, rarely albino.—A characteristic little flower of the oak barrens. Summer.

4. **P. argillacea** Clute & Ferris. Taller than the preceding, forming compact clumps 4-8 dm. tall; inflorescence larger and more open; leaves inclined to be revolute, very narrow, long-pointed; corolla tube 2.5-3 cm. long, the limb white or sometimes pale lilac; lobes entire.—Sandy oak woods of the high dune country and Calumet District, especially around Liverpool (Clute). Blooming later and longer than the preceding.

5. **P. divaricata** L. (*Blue Phlox.*) 2-5 dm. tall, slender, few-leaved, puberulent on stem and oblong and lance-ovate leaves; cyme corymbose-panicled, spreading, loosely flowered; flowers bluish or pale lilac, or rarely white, the lobes obcordate or wedge-obovate, notched or entire at the end, the sinuses between them rather large.—In rich dune woods and along river banks of the western Calumet District. May, June.

6. **P. bifida** Beck. 1-2 dm. long, the stems ascending, branched, minutely pubescent; leaves glabrescent, linear; flowers few, slender-peduncled; corolla pale purple, its lobes cleft to or below the middle, forming linear-oblong divisions.—A beautiful flower characteristic of the high wooded dunes in spring.

WATERLEAF FAMILY (Hydrophyllaceae)

Mostly hairy herbs with alternate, often pinnately or palmately lobed or divided leaves, and regular perfect 5-merous flowers in cymes or false racemes which are coiled from the apex when young; corolla in our species with small folds or appendages in the throat; ovary 1-celled; fruit a 2-valved, 4-seeded capsule; seeds generally pitted or reticulated.

Stamens more or less exserted; calyx unchanged in fruit.....	*Hydrophyllum* 1.
Stamens included; calyx enlarged in fruit	*Ellisia* 2.

1. HYDROPHYLLUM L. Waterleaf

Perennials with creeping woolly rootstocks and petioled ample leaves and cymose clusters of white or bluish flowers; corolla bell-shaped, 5-cleft, the tube with 5 longitudinal linear appendages opposite the lobes, forming nectariferous grooves; stamens and style distinctly or slightly exserted; fruit a 1-4-seeded capsule.

Calyx bare of appendages, or minutely appendaged......... *H. virginianum* 1.
Calyx with a small reflexed lobe in each sinus.............. *H. appendiculatum* 2.

1. **H. virginianum** L. 2-7 dm. tall, smoothish; leaves pinnately 5-7-divided, the divisions oblong, pointed, cut-toothed; lowest leaves mostly 2-parted, the uppermost confluent; peduncles forked, longer than the petioles of the upper leaves; calyx-lobes bristly-ciliate, narrowly linear; flowers 1 cm. long or less.—Shady ground and rich woods of the Calumet District. May-July.

2. **H. appendiculatum** Michx. Hairy; leaves palmately 5-lobed or the lowest pinnately divided; cymes loose; calyx bristly-hairy.—In damp woods, rare. May, June.

2. ELLISIA L.

Delicate branching annuals with divided or lobed leaves, the lower always opposite; flowers small, whitish; corolla cylindrical or bell-shaped, not surpassing the calyx, 5-lobed, the tube with five minute appendages within.

1. **E. Nyctelea** L. 1-4 dm. tall, divergently branched, sparingly rough-hairy; leaves pinnately parted, the segments 7-13, cut-toothed, lanceolate; peduncles opposite the leaves or solitary in the forks; calyx lobes lanceolate, in fruit ovate-lanceolate; capsule drooping. (*Macrocalyx* Ktze., *Nyctelea* Britton; *N. ambigua* Standley.)—Reported as rare in the Calumet District, southwestern prairies (H. & R.). April-July.

BORAGE FAMILY (Boraginaceae)

Mostly rough-hairy herbs with entire alternate leaves, and symmetrical flowers with a 5-parted calyx, a regular 5-lobed corolla (except in *Echium*) with the 5 stamens inserted on its tube, a single style and usually a deeply 4-lobed ovary; fruit consisting of 4 seed-like nutlets, separating into two 2-seeded or four 1-seeded nutlets; flowers mostly on one side of the branches of a reduced cyme which is rolled up from one end, and straightens as the blossoms expand.

Flowers regular.
  Flowers not subtended by bracts or leaves, in naked racemes or clusters of the lowest flowers sometimes in leaf axils.
    Leaves small, rarely 1.5 cm. wide; corolla salverform; nutlets unarmed, attached at base.............. *Myosotis* 3.
    Leaves larger, 2 cm. wide or more; corolla funnelform; nutlets attached at the side, prickly............ *Cynoglossum* 1.

Flowers subtended by bracts or borne in the leaf axils.	
Stem leaves long-petioled; fruit with barbed prickles; nutlets attached at the side	*Lappula* 2.
Stem leaves sessile; fruit unarmed; nutlets attached at base	*Lithospermum* 4.
Flowers irregular; nutlets unarmed, attached at base	*Echium* 5.

1. CYNOGLOSSUM L. Hound's Tongue

Coarse herbs with petioled lower leaves and panicled racemes; corolla tube about equalling the 5-parted calyx, the lobes rounded; stamens included; nutlets convex or depressed, oblique.

Clothed with soft hairs, panicled above	*C. officinale* 1.
Roughish with spreading bristly hairs; stem simple	*C. boreale* 2.

1. **C. officinale** L. (*Common Hound's Tongue.*) Tall perennial or biennial, the upper leaves lanceolate, closely sessile by a heart-shaped or rounded base; corolla reddish purple or rarely white; nutlets flat on the broad upper surface, somewhat margined.—A strong-scented weed in abandoned pastures, especially on limy soil, locally throughout, but especially around cities in the Calumet District. The burs are a pest in sheep's wool. Nat. from Eu. Summer.

2. **C. boreale** Fernald. (*Wild Comfrey.*) Perennial, few-leaved, 3-8 dm. tall; upper stem-leaves lanceolate-oblong, clasping by a deeply heart-shaped base; racemes corymbed, few; corolla pale blue; nutlets strongly spiny, compressed, pyriform-ovoid.—A pretty little plant in sandy open woods of the Calumet District. Spring.

2. LAPPULA Moench. Stickseed

Rough-hairy and grayish herbs with small flowers in spikes or racemes; corolla salverform, short; nutlets triangular or compressed.

Stout pedicels not deflexed; calyx becoming leaf-like; leaves linear, lanceolate, or the lower spatulate; hispid annuals	*L. echinata* 1.
Slender pedicels recurved or deflexed in fruit; calyx lobes short, at length reflexed; biennial or perennial, not hispid	*L. virginiana* 2.

1. **L. echinata** Gilib. 1.5-6 dm. tall; nutlets rough-granulate or tuberculate on the back, the margins with a double row of slender distinct prickles; flowers blue. (*L. Lappula* Karst.; *Echinospermum Lappula* Lehm.)—A European weed, occasionally found in waste ground, Calumet District. Summer.

2. **L. virginiana** (L.) Greene. (*Beggar Lice.*) 3-12 dm. tall, the radical leaves round-ovate or cordate, slender-petioled; stem leaves oblong-lanceolate to ovate-oblong, pointed at both ends; racemes loose and spreading; flowers white; nutlets of the globose fruit equally short-glochidiate over the whole back. (*Echinospermum virginicum* Lehm.; *Hackelia* Johnston.)—In low rich woods, Dune Creek and eastward through the dunes. Summer.

3. MYOSOTIS L. Forget-me-not

Low and mostly soft-hairy herbs with entire leaves, the stem leaves sessile; flowers small, in racemes, these straightened in fruit; corolla tube about the length of the 5-toothed or 5-cleft calyx, the throat with 5 small blunt arching appendages opposite the rounded lobes; stamens included; nutlets compressed.

Calyx lobes much shorter than the tube.................. *M. scorpioides* 1.
Calyx lobes as long as the tube.......................... *M. laxa* 2.

1. **M. scorpioides** L. (*Garden Forget-me-not.*) Perennial with creeping stems, ascending at the tips, loosely branched, smoothish, except the rough-pubescent oblong-lanceolate or linear-oblong leaves; corolla sky blue with yellow eye.—Nat. from Eu. around some of our cities. Summer.

2. **M. laxa** Lehm. (*Wild Forget-me-not.*) Perennial from subterranean slender shoots, the stems decumbent; pubescence appressed; leaves spatulate or lanceolate-oblong; corolla very light blue.—In slow streams, alder swamps, and damp grass, Miller to Dune Creek. Summer and autumn.

4. LITHOSPERMUM L. Gromwell. Puccoon

Roots red and thickish; flowers solitary and as if axillary, or spiked and leafy-bracted; corolla throat often with a more or less clearly marked fold opposite each lobe; anthers included; nutlets roughened or smooth, bony or stony.

Throat of the white corolla without folds or appendages; nutlets tubercled or rough-wrinkled and pitted, gray; annual or biennial................................ *L. arvense* 1.
Throat of the greenish-white or yellow or orange corolla with appendages in the throat; nutlets smooth, shining, ivory white; perennials.
  Corolla greenish-white or pale yellow.................. *L. latifolium* 2.
  Corolla bright orange.
    Hispid with bristly hairs; flowers peduncled; corolla woolly-bearded at the base inside.............. *L. carolinense* 3.
    Soft-hairy and hoary; flowers sessile; corolla not hairy at the base within............................ *L. canescens* 4.

1. **L. arvense** L. (*Corn Gromwell.*) Stems 2-7 dm. tall, hoary and rough; leaves linear or lanceolate, veinless; corolla inconspicuous, scarcely longer than the calyx.—A homely European weed, in sandy waste ground, Indiana Harbor to Dune Park. May-August.

2. **L. latifolium** Michx. 5-9 dm. tall, rough, loosely branched; leaves taper-pointed, ribbed-veined, ovate-lanceolate, the basal large and round, rough above, soft-pubescent beneath; corolla very small, shorter than the calyx. (*L. luteum* House.)—In sandy ground, locally throughout. Summer.

3. **L. carolinense** (Walt.) MacM. (*Puccoon.*) Root long and deep; 2-8 dm. tall; stem leaves linear or lanceolate, those of the flowering branches bristly-ciliate and ovate-oblong; flowers showy, crowded;

fruiting calyx 3-4 times longer than the nutlets. (*L. Gmelini* Hitchc.; *L. hirtum* Lehm.)—A characteristic but rather local plant of the dunes and the northern sand plains of the Calumet District, extending east to Michigan City. April-June. Roots yielding a red dye.

4. **L. canescens** (Michx.) Lehm. (*Puccoon.*) Roots long and deep; plant 2-5 dm. tall; leaves roughish with appressed hairs above, downy beneath, obtuse, linear-oblong or the upper ovate-oblong; flowers crowded, showy; fruiting calyx barely twice the length of the nutlets. —Sandy prairies and wet thickets, common from Roby and Hammond to Dune Park. April, May.

5. ECHIUM L. Viper's Bugloss

Biennial or perennial bristly-hirsute branching herbs with rather large flowers in the leafy-bracted scorpioid spikes; corolla tubular-funnelform, the limb unequally 5-lobed, the throat unappendaged; stamens unequal in length, the longer exserted; nutlets ovoid, rugose.

1. **E. vulgare** L. (*Blue-weed, Blue Devil.*) Biennial 3-9 dm. tall; stem leaves sessile, linear-lanceolate; flowers in short lateral clusters, disposed in long and narrow thyrses or in open panicles; buds pink; flowers showy, brilliant blue (rarely pale or rosy).—A handsome but pestiferous weed of rather recent naturalization from Europe, found rarely in our area on limy soils about cities of the Calumet District. June-September.

VERVAIN FAMILY (Verbenaceae)

Our species herbs with generally square stems and opposite leaves and more or less 2-lipped and irregular corollas; calyx bracted; stamens 2 or 4; ovary not 4-lobed but with a single terminal style; fruit a drupe or berry or if dry separating into 2 nutlets; seeds solitary.

Resembling the mints, but without oily-aromatic properties, and differing as to the ovary.

Calyx tubular; fruit splitting into 4 nutlets................ *Verbena* 1.
Calyx short, 2-cleft; fruit splitting into 2 nutlets........... *Lippia* 2.

1. VERBENA L. Vervain

Flowers sessile, in bracted spikes; calyx with 1 tooth shorter than the 4 others; corolla often curved, salverform, unequally 5-cleft; stamens included; style slender, stigma 2-lobed.

Anthers not appendaged; flowers small, in slender spikes.
  Spikes very narrow with flowers or at least fruit scattered. *V. urticaefolia* 1.
  Spikes thicker or densely flowered; fruit crowded and overlapping.
    Perennials with small bracts not exceeding the flowers.
      Leaves petioled.................................. *V. hastata* 2.
      Leaves sessile.

Leaves lanceolate, slightly toothed.............. *V. angustifolia* 3.
Leaves obovate or oblong, serrate................ *V. stricta* 4.
Annuals with large, leafy, often pinnatifid bracts exceeding the flowers.......................... *V. bracteosa* 5.
Anthers of the lower stamens glandular-tipped; flowers large and showy, the inflorescence depressed-capitate, or tending toward a thick spike..................... *V. bipinnatifida* 6.

1. **V. urticaefolia** L. (*White Vervain.*) Tall perennial, as much as 1.5 m. high, minutely pubescent or glabrous; leaves oval or oblong-ovate, coarsely serrate, petioled, acute; spikes loosely panicled; flowers very small, white.—Thickets, roadsides and waste ground throughout. Summer.

2. **V. hastata** L. (*Blue Vervain.*) Tall, as much as 2 m.; lower leaves generally halberd-shaped or lobed; upper lanceolate or oblong-lanceolate, taper-pointed, rugose; spikes corymbed or panicled, linear, erect; flowers violet-blue or rarely pink or white.—Sandy fields, prairies, and outskirts of cities, common, especially in the Calumet District. Summer and early autumn.

3. **V. angustifolia** Michx. 2-6 dm. tall, often unbranched; leaves tapering to the base, roughish; spikes few or single; flowers rather larger than in the preceding, crowded, purple.—Sandy ground of the Calumet District. Summer.

4. **V. stricta** Vent. (*Hoary Vervain.*) 3-9 dm. tall, simple or branched, erect, downy with white and soft hairs; spikes thick, clustered, hairy; flowers purple, rather larger than those of other species except No. 6.—This handsome species of the barrens and prairies is found just within the limits of our flora, near the Little Calumet between Dune Park and East Gary. Summer.

5. **V. bracteosa** Michx. A more or less prostrate and spreading, hairy plant with wedge-lanceolate, cut-pinnatifid or 3-cleft, short-petioled leaves and remotely flowered solitary spikes; flowers small and purple.—Along the railroad embankments of the Calumet District; probably not native here though found on prairies of Indiana and Illinois. Summer.

6. **V. bipinnatifida** Nutt. 1-4 dm. tall, hispid-hirsute; leaves bipinnately parted or 3-parted into more or less bipinnatifid segments, the lobes linear or lanceolate; bracts surpassing the calyx; corolla lilac or bluish-purple, almost regular and salverform, the limb 1-1.5 cm. broad.—A handsome plant often cult., and resembling a phlox, native on plains and prairies from S. Dak. to Mex., nat. along railroad embankments of the Calumet District. Summer.

2. LIPPIA L. Frog-fruit

Our species herbs with small capitate clusters of flowers on long axillary peduncles; calyx 2-lipped or 2-4-toothed, often flattened; corolla 2-lipped, the upper lip notched, the lower 3-lobed and larger; stamens included; style slender; stigma obliquely capitate. *L. citriodora* HBK., the aromatic lemon-verbena, is often cultivated.

1. **L. lanceolata** Michx. Trailing, or with the tip erect; leaves oblanceolate to lanceolate, serrate above; peduncles slender, exceeding the leaves, bearing the solitary, closely bracted heads of bluish-white flowers.—Mud and banks of the Little Calumet at Dune Park, and westward along the Little and Grand Calumet Rivers from Miller and East Gary throughout the Calumet District, especially around Wolf Lake. Summer. An inconspicuous, rather weedy plant, easily overlooked, especially when growing among the rank vegetation of river banks.

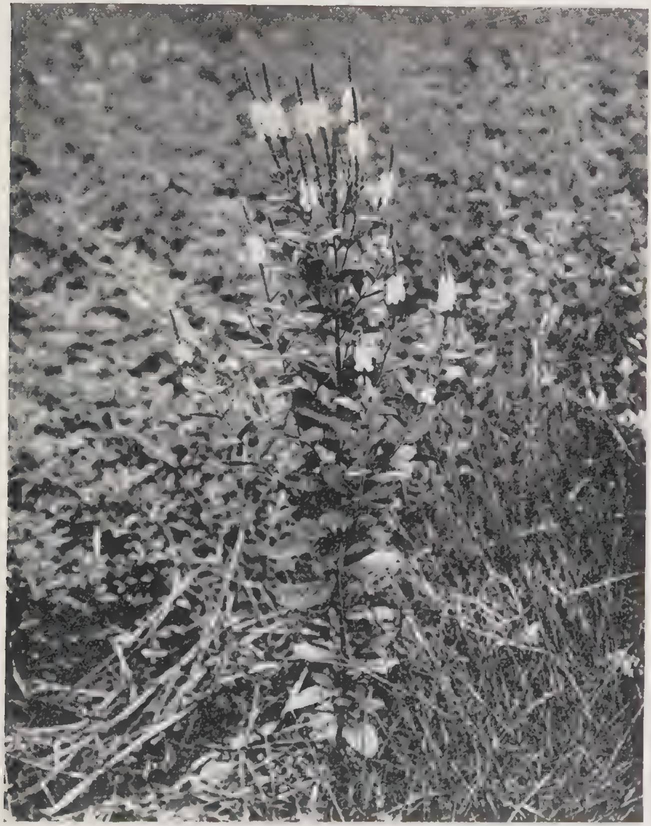


FIG. 27. HOARY VERVAIN (*Verbena stricta*)

MINT FAMILY (Labiatae)

Our species herbs with square stems and opposite, generally aromatic leaves; flowers axillary in cymose clusters, these often forming together a terminal raceme or spike. Corolla more or less 2-lipped, the upper lip 2-lobed or sometimes entire, the lower lip 3-lobed; stamens ascending in 2 pairs, or rarely 1 pair, on the throat of the corolla; ovary deeply 4-lobed, forming in fruit a cluster of 4 seed-like nutlets surrounding the base of the single style in the bottom of the persistent calyx; style 2-lobed at apex.

In most species a more or less mint-like odor is present, given off by oil glands in the leaves (these often visible to the naked eye). A family rather abundant and characteristic in our area, abundant at least as regards individuals, but not particularly in species.

- Inflorescence of dense axillary whorls, compact heads or close spikes.
  - Flowers axillary, without conspicuous colored bracts, sessile.
    - Corolla strongly 2-lipped; leaves rounded or cut-lobed.
      - Whitish-woolly plants; flowers white.............. *Marrubium* 9.
      - Not white-woolly; flowers pale purple.............. *Leonurus* 8.
    - Corolla nearly regular; leaves ovate to lanceolate.
      - Plants strongly odorous; fertile stamens 4........... *Mentha* 17.
      - Plants not odorous; fertile stamens 2.............. *Lycopus* 16.
  - Flowers terminal or terminal and axillary, often with conspicuous colored bracts.
    - Bracts broad, much exceeding the flowers, brightly colored.................................. *Monarda* 11.
    - Bracts narrow, or if broad, the upper not exceeding the flowers.
      - Flowers in heads; plants corymbosely branched...... *Pycnanthemum* 15.
      - Flowers in spikes.
        - Plants soft-downy; corolla white, spotted with purple.................................. *Nepeta* 5.
        - Plants somewhat pubescent.
          - Calyx deeply 2-lipped....................... *Prunella* 6.
          - Calyx lobes all equal or the upper merely a little longer.
            - Calyx lobes equal; plant very aromatic....... *Mentha* 17.
            - Calyx lobes somewhat unequal; plant but slightly aromatic.................... *Agastache* 4.
- Inflorescence composed of loosely several-flowered terminal or axillary racemes of loose interrupted spikes.
  - Calyx with a prominent protuberance on the upper side, not toothed.................................. *Scutellaria* 3.
  - Calyx with a protuberance on the lower side, 2-lipped..... *Hedeoma* 12.
  - Calyx without a protuberance, toothed.
    - Flowers not in spikes or racemes, but in axillary 1-few-flowered clusters......................... *Satureja* 13.
    - Flowers in spikes or racemes.
      - Flowers either nearly regular or seemingly 1-lipped.
        - Spikes thick; flowers large, 1-lipped.............. *Teucrium* 1.
        - Spikes slender; flowers small, regular.

Flowers in dense axillary whorls.	*Mentha* 17.
Flowers 1-3 on a peduncle, peduncles solitary in the axils	*Isanthus* 2.
Flowers distinctly 2-lipped.	
Spikes composed of interrupted whorls of small flowers.	
Corolla tube dilated in the throat	*Clinopodium* 14.
Corolla tube not dilated in the throat.	*Stachys* 10.
Spikes composed of a continuous but loose inflorescence; flowers large and showy	*Dracocephalum* 7.

1. TEUCRIUM L. Germander

Our species perennials with cylindric, spike-like, terminal inflorescences, the leaves hoary or white-villous beneath, the calyx densely hairy, 5-toothed; corolla with the 4 upper lobes nearly equal, turned forward, lower lip apparently none; stamens 4, exserted from the deep cleft in the upper lobes of the corolla.

Stems appressed-pubescent; calyx canescent; corolla 1.5-2 cm. long	*T. canadense* 1.
Stems villous; calyx villous; corolla 0.8-1.2 cm. long	*T. occidentale* 2.

1. **T. canadense** L. (*American Germander.*) Stems 1 m. or less tall; leaves ovate to lanceolate, serrate, short-petioled; whorls about 6-flowered, crowded into simple, long, wand-like racemes; corolla purplish, pink, or sometimes creamy.—In rich low ground of the subdunal marshes and the Calumet District. July-September.

2. **T. occidentale** Gray. (*Wood Sage.*) Stem 3-9 dm. tall; leaves ovate- to lance-oblong; calyx villous, often with viscid hairs and capitate glands; corolla similar in coloring to the preceding. (*T. boreale* Bicknell is a species with inconstant limits, but specimens bearing some of its characters are found in our area.)—Low ground of Calumet District, especially Wolf Lake. July-September.

2. ISANTHUS Michx. False Pennyroyal

Low, clammy, branching annual with 3-nerved, narrow, entire leaves and pale blue, small flowers; calyx equally 5-lobed, enlarging in fruit; corolla scarcely longer than the calyx, bell-shaped, merely oblique, not 2-lipped.

1. **I. brachiatus** (L.) BSP. Peduncles 1-3-flowered, axillary; corolla 5 mm. long, with obovate lobes; stamens incurved-ascending, included.—In dry sterile soil and as a railway weed, northern Calumet District and Dune Park. Summer.

3. SCUTELLARIA L. Skullcap

Bitter perennial herbs without aromatic properties; the short peduncles or pedicels chiefly opposite, 1-flowered, often 1-sided, axillary or spiked; calyx bell-shaped in flower, splitting to the base at maturity, the lips entire, the upper falling away; corolla with a curved, long throat, the upper lip entire or notched, the lateral lobes connected with the upper, the lower notched, spreading-convex; stamens ciliate, ascending under the upper lip; nutlets in our species wingless, marginless.

Flowers small, 5-8 mm. long, in axillary or sometimes terminal 1-sided racemes.................................. *S. lateriflora* 1.
Flowers solitary in the axils of the upper leaves or in a terminal raceme, the floral leaves small.
  Flowers 1.7-2.2 cm. long.............................. *S. galericulata* 2.
  Flowers 5-10 mm. long.............................. *S. parvula* 3.

1. **S. lateriflora** L. (*Mad-dog Skullcap.*) Smooth, 1-8 dm. tall, branched; leaves ovate-oblong or lanceolate-ovate, coarsely serrate, rounded at base, petioled, pointed; flowers blue, rarely pink or white. —In low moist ground of the subdunal meadows and marshes and throughout the northern Calumet District. Summer.

2. **S. galericulata** L. With subterranean creepers; smooth or a little downy, 1-9 dm. tall; leaves oblong or ovate-oblong, sessile or on short petioles, serrate, acute, roundish at base; flowers solitary in the axils of the upper leaves, violet-blue. (*S. epilobiifolia* Hamilton.)—Wet prairies or meadows, moist swales, margins of creeks, etc., Wolf Lake south to Gibson and east to Dune Creek and Keiser. June-August.

3. **S. parvula** Michx. Subterranean shoots bearing strings of little tubers; plant pubescent throughout with spreading, often sticky hairs, 0.8-3 dm. tall, branched; all but the lower leaves sessile, entire or slightly heart-shaped; flowers axillary, violet.—Sandy banks of the Little Calumet between Dune Park and E. Gary. April-July. Var. **ambigua** (Nutt.) Fernald. Minutely puberulent or glabrate. Occurs with the type.

4. AGASTACHE Clayt. Giant Hyssop

Tall perennial plants with serrate petioled leaves and small flowers in interrupted terminal spikes; calyx 15-nerved, tubular-bell-shaped, oblique, 5-toothed, the upper teeth longer; upper lip of corolla 2-lobed, erect, lower 3-cleft; stamens exserted, 4, the upper pair declined, the lower ascending, so that the pairs cross.

1. **A. nepetoides** (L.) Ktze. Stout-stemmed, up to 1.5 m. tall, smooth; leaves ovate, coarsely crenate; spikes crowded with bracts; calyx teeth ovate, almost equalling the pale yellow corolla. (*Lophanthus* Benth.)—In open woods, occasional throughout. Summer. *A. scrophulariaefolia* (Willd.) Ktze. was formerly reported from our area but specimens have proved to be this species.

5. NEPETA L. Catmint

Perennial herbs with tubular, often incurved calyx and a corolla with dilated throat, the upper lip erect, notched or 2-cleft, concave; in our species the clusters are densely many-flowered, forming an interrupted spike or raceme, the upper floral leaves small and bract-like.

1. **N. Cataria** L. (*Catnip.*) Branched and downy, 6-9 dm. tall; leaves deeply crenate, oblong-heart-shaped, whitish-downy beneath; corolla whitish, dotted with purple. (*Glechoma* Kuntze.)—An occasional European weed found around cities and barns. Summer.

6. PRUNELLA L. Heal-All. Carpenter's Weed

Low perennials with nearly simple stems and 3-flowered clusters of sessile flowers in the axils of round and bract-like floral leaves, the clusters close together, forming a compact spike or head; calyx somewhat 10-nerved, tubular-bell-shaped, closed in fruit, the upper lip truncate, broad; corolla slightly contracted in the throat and dilated at the lower side just beneath it, 2-lipped, the upper lip arched, the lower reflexed-spreading; anthers approximate in pairs; filaments 2-toothed. (*Brunella.*)

1. **P. vulgaris** L. 1-4 dm. tall, hairy or smoothish, as are the ovate or oblong, entire or toothed, petioled leaves with rounded bases; corolla violet, flesh-color, purplish or white, not twice as long as the calyx.—A weed nat. from Eu., around cities and farms, also, rarely, in woods. June-November.

Var. **lanceolata** (Barton) Fernald. With the margins of the bracts of the inflorescence copiously ciliate with long white hairs, and the principal median leaves lanceolate to oblong, the base narrowed or cuneate; corolla bluish or violet; calyx green (or purplish in the forma *iodocalyx* Fernald).—A common native plant found in woods and fields throughout; very abundant in the high dune country.

7. DRACOCEPHALUM L. Virginia Dragon Head

Smooth perennials with wand-like stems and sessile, serrate leaves, the flowers opposite, crowded in leafless spikes or racemes; calyx short-tubular or bell-shaped, enlarged in fruit, obscurely 10-nerved; corolla funnelform with inflated throat, 2-lipped, the upper nearly entire, the lower spreading, small, its middle lobe large and notched.

1. **P. virginianum** L. Stem 0.5-1.3 m. tall, leafy to the terminal wand-like spike or panicles of spikes; leaves thickish, lanceolate or oblong, acute at both ends; corolla 1.8-2.3 cm. long, pale purple or rose, generally variegated with white. (*Physostegia* Benth.)—A very beautiful prairie plant of the Calumet District. June-September.

8. LEONURUS L. Motherwort

Leaves cut-lobed, the flowers in close axillary whorls; calyx with 5 nearly equal teeth, 5-nerved; upper corolla lip oblong, entire, arched; lower 3-lobed, spreading, the middle lobe entire, elongate.

1. **L. Cardiaca** L. Tall perennial with long-petioled leaves, the lower palmately lobed and rounded, the upper subentire or 3-cleft; corolla pale purple, the upper lip bearded.—A European weed in waste ground around cities of the Calumet District. June-August.

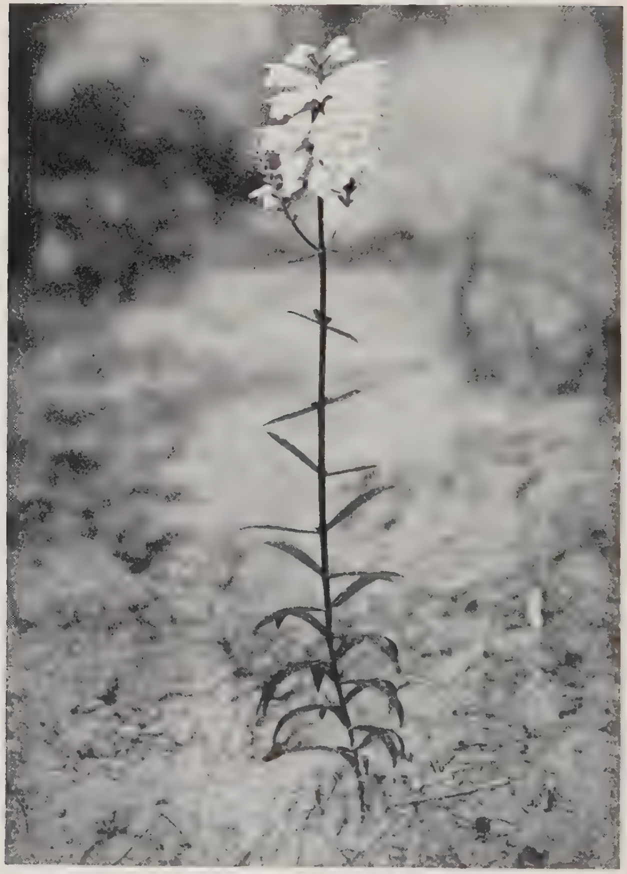


FIG. 28. DRAGON HEAD (*Dracocephalum virginianum*)

9. MARRUBIUM L. Horehound

Whitish-woolly, bitter-aromatic perennials, the stems branched at base, the rugose leaves crenate or cut-toothed; flowers numerous in axillary whorls; calyx teeth spiny-pointed and spreading; upper lip of the corolla erect, notched, lower 3-cleft, spreading, the middle lobe broadest.

1. **M. vulgare** L. Stems ascending; leaves crenate-toothed, petioled, round-ovate; calyx with 10 alternately longer and shorter recurved teeth; corolla small, white.—In waste ground and open or browsed-over woodlands of the Calumet District and occasionally eastward in old fields among high dunes. June-August.

10. STACHYS L. Hedge Nettle

Our species perennials with loosely verticillate clusters of flowers in terminal spikes; corolla not dilated at the throat, the upper lip often arched, entire, the lower long, spreading, three-lobed, the middle lobe largest and nearly entire; stamens 4, ascending under the upper lip or relaxed at the throat after flowering; anthers approximate in pairs; nutlets obtuse.

Stems glabrous on the sides, smooth or bristly on the angles.	
Leaves entire or obscurely toothed	*S. hyssopifolia* 1.
Leaves regularly serrate or serrulate	*S. tenuifolia* 2.
Stems pubescent or puberulent on the sides as well as on the angles which may be pubescent or bristly.	
Leaves subsessile or very short-petioled, the lower petioles not conspicuously longer than the upper	*S. palustris* 3.
Leaves on elongate petioles, the upper petioles shorter than the lower	*S. cordata* 4.

1. **S. hyssopifolia** Michx. Stems slender, 2-5 dm. tall, the plant smooth and glabrous or the nodes hirsute; leaves sessile, narrowly linear or linear-oblong; whorls distant, 4-6-flowered; corolla light purple.—A coastal plain species found only in dune meadows, Dune Park to Michigan City. July-September.

2. **S. tenuifolia** Willd. var. **aspera** (Michx.) Fernald. Angles of the stem beset with long reflexed bristles; leaves ovate- to oblong-lanceolate, more or less hairy, short-petioled; spike slender and interrupted; corolla red-purple.—In wet grasslands, Roby and eastward, close to the Lake, to Michigan. July, August.

3. **S. palustris** L. (*Woundwort.*) Stems 3-10 dm. tall; angles hirsute with spreading or reflexed hairs, sides with fine appressed pubescence; leaves lanceolate to ovate-oblong, crenate-serrate, downy or hairy; whorls 6-10-flowered, the upper crowded into an interrupted spike; calyx teeth spiny; corolla purplish, with darker purple spots, or pale red.—In our area rather variable as to leaf and pubescence, common in wet ground, Hammond to Dune Park. Summer.

4. **S. cordata** Riddell. Stem weakish, long-hirsute on the angles, 6-8 dm. tall; leaves all ovate- or oblong-cordate, crenate, acuminate, the floral leaves minute; spikes slender; calyx small, with very short teeth; corolla purplish.—Rare in woods, Hammond. Summer.

11. MONARDA L. Horse Mint

Aromatic plants with large showy flowers in a few verticels closely surrounded by mostly colored bract leaves; calyx hairy in the throat, 15-nerved; corolla slightly expanded at the throat, elongate, its lips oblong and linear, the upper erect, nearly entire, the lower spreading, 3-lobed, the middle lobe notched; stamens elongated, ascending.

Stamens not exceeding the curving upper lip of the short corolla; heads axillary or interrupted-spicate; leaves oblong or lanceolate, sparsely serrate, tapering into the petiole.. *M. punctata* 1.
Stamens and style exserted beyond the linear straight acute upper lip of the corolla; heads solitary and terminal or 2 or 3; leaves acutely serrate.
  Leaves canescent, especially beneath, with minute appressed puberulence................................ *M. mollis* 2.
  Glabrous as to leaf, or pubescent but not canescent.
    Floral leaves and outer bracts whitish or purplish...... *M. fistulosa* 3.
    Floral leaves and outer bracts tinged with red......... *M. didyma* 4.

1. **M. punctata** L. (*Horse Mint.*) Minutely downy, 3-9 dm. tall, with lanceolate, petioled leaves narrowed at base; bracts blunt, sessile, yellowish or purple, lanceolate; teeth of the downy calyx short and rigid; corolla nearly smooth, yellowish, the upper lip spotted with purple, notched.—Very common throughout, especially in dune woods and old fields. July, August.

2. **M. mollis** L. Tall branching stem with firm deltoid or oblong leaves, the tips long-acuminate; calyx throat densely bearded inside; corolla glandular, the upper lip hairy outside, bearded at the tip, flesh color to lilac.—Has been found as a waif along railroad tracks, Miller; probably nat. from Great Plains, but has also been found as a native on prairies of the Calumet District. July, August.

3. **M. fistulosa** L. (*Wild Bergamot.*) 5-15 dm. tall, the branches more or less villous or hirsute; leaves pubescent especially beneath, ovate-lanceolate; calyx curved, hairy in throat; corolla lilac or pink, upper lip very hairy.—A very common plant in woods and fields throughout. July, August.

4. **M. didyma** L. (*Bee Balm, Oswego Tea.*) Tall, somewhat hairy; leaves acuminate, ovate-lanceolate; calyx nearly naked in the throat; corolla deep bright red.—This exceedingly showy plant, often cultivated, is very rare in our area, on prairies of the western Calumet District. July, August.

12. HEDEOMA Pers. Mock Pennyroyal

Low, small-leaved annuals with terminal leafy racemes; calyx gibbous on the lower side, bearded in the throat, 2-lipped, 1-3-nerved.

1. **H. pulegioides** (L.) Pers. (*American Pennyroyal.*) Branching, hairy; whorls few-flowered; corolla bluish, pubescent, 3-5 mm. long, scarcely longer than the calyx.—An aromatic plant of dry soils near the Lake, especially in the dune country. Summer.

13. SATUREJA L. Calaminth. Savory

Our species with interrupted spikes of loosely flowered clusters of purplish or whitish blossoms; calyx cylindrical to tubular, hairy in the throat, 10-13-nerved; corolla with inflated throat and straight tube, distinctly 2-lipped, the upper lip flattish and erect, the lower 3-parted with larger middle lobe. (*Satureia.*)

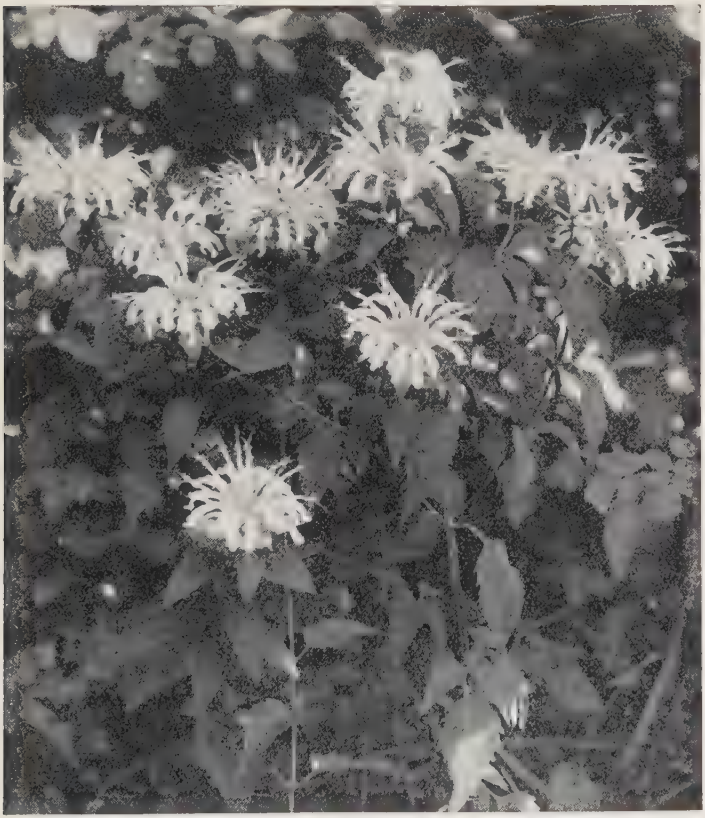


FIG. 29. WILD BERGAMOT (*Monarda fistulosa*)

1. **S. glabra** (Nutt.) Fernald. Nearly glabrous plant with diffuse stems, the flowering ones rather upright, 1.5-4 dm. tall; leaves mostly entire, narrow, except for the ovate thickish leaves borne on sterile runners from the base; corolla purple. (*Clinopodium* Ktze., *Calamintha Nuttallii* Britton.)—In low open sandy ground close to Lake Michigan. May-August.

14. CLINOPODIUM L.

Differing from *Satureja* in having flowers nearly sessile in dense, many-flowered clusters and involucrate with conspicuous, long, narrow, stiff-tipped bracts; calyx nearly naked in the throat.

1. **C. vulgare** L. 2-6 dm. tall, hairy; leaves nearly entire, petioled, ovate; flowers in globular clusters, pink or lavender; hairy bracts as long as the calyx. (*Satureja vulgaris* Fritsch; *Calamintha Clinopodium* Benth.)—This interesting little plant, native in America as well as Eu., has so far been found in our area only in a dune meadow near Keiser (Lyon). It may be more widespread. Summer.

15. PYCNANTHEMUM Michx. Mountain Mint

Pungent, mint-flavored plants corymbosely branched above, the floral leaves or bracts often whitened; many-flowered whorls dense, forming cymes or terminal heads; calyx naked in throat, about 13-nerved; corolla 2-lipped, short, the upper lip flat, nearly entire, the lower 3-cleft with obtuse lobes; lower pair of stamens longer than the upper.

Leaves linear.. *P. flexuosum* 1.
Leaves lanceolate.................................... *P. virginianum* 2.

1. **P. flexuosum** (Walt.) BSP. Smooth, branching, with firm leaves, the heads of flowers small, densely corymbed, downy; bracts rigid and somewhat prickly; calyx with short firm points; corolla small, white, purple-dotted. (*Koellia* MacM.)—Sandy fields, and by roadsides. Summer.

2. **P. virginianum** (L.) Durand & Jackson. Stem 2-10 dm. tall, smoothish or minutely pubescent; leaves nearly sessile, entire, lanceolate or lance-linear, very numerous; flower heads in small glomerules, these numerous and densely flowered, overlapping by many short rigid downy bracts; calyx teeth short and triangular; corolla as in the preceding. (*Koellia* Ktze.)—Very common in dune meadows, sandy fields, etc. Summer.

16. LYCOPUS L. Water Horehound

Perennials, mostly producing subterranean creepers, resembling the true mints (*Mentha*), with sharply toothed or pinnatifid leaves, the floral ones long, not reduced or bract-like; flowers small, in axillary whorls; calyx 4-5-toothed, naked in the throat, bell-shaped; the upper lip of the white or barely pinkish corolla flattish, notched, erect, the lower 3-cleft; stamens exserted, erect; 2 sterile filaments accompany the long fertile stamens.

Leaves incised or pinnatifid, at least at the base........... *L. americanus* 1.
Leaves merely serrate.
  Calyx teeth narrow, very acute, longer than the nutlets... *L. rubellus* 2.

Calyx teeth lanceolate or deltoid, barely acutish, shorter than the mature nutlets.	
Leaves ovate or ovate-oblong, rather abruptly narrowed at both ends; corolla with erect lobes...........	*L. virginicus* 3.
Leaves lanceolate or lance-oblong, gradually narrowed at both ends; corolla with flaring lobes..........	*L. uniflorus* 4.

1. **L. americanus** Muhl. Slender, 2-9 dm. tall, acutely 4-angled, glabrate, freely sending out underground shoots; leaves lanceolate or oblong, irregularly incised or laciniate-pinnatifid, acuminate, the upper narrow and merely sinuate, all tapering to slender petioles; sterile filaments conspicuous, with spatulate tips.—Frequent in wet ground and dune swales, Indiana Harbor to Michigan City.

2. **L. rubellus** Moench. Stem rather obtusely 4-angled; leaves sharply serrate in the middle, petioled, oblong-lanceolate or ovate-oblong, attenuate-acuminate at both ends; calyx teeth long and slender but not rigid-pointed.—In the backwaters of Trail Creek, on the outskirts of Michigan City. July-October.

3. **L. virginicus** L. (*Bugle Weed.*) Similar to the preceding, 2-8 dm. tall, puberulent, rising from a slender (not tuberous-thickened) base; leaves dark green or purple-tinged, firm, coarsely toothed; glomerules dense, often compound; calyx teeth rather short.—In rich moist soil, Roby to Dune Park. July-September.

4. **L. uniflorus** Michx. (*Bugle Weed.*) Similar to the preceding but with a tuberous base, the creepers bearing tubers, also more slender, and glabrate; leaves light green, rarely purple-tinged; glomerules smaller and less dense. (*L. communis* Britton.)—In sloughs, Pine to Dune Creek. Summer and autumn.

17. MENTHA L. Mint

Aromatic perennials with small flowers in close clusters, forming axillary capitate whorls, sometimes interrupted spikes; calyx bell-shaped or tubular, with 5 equal teeth; corolla with a short tube, the upper lobe slightly broader, entire or notched; stamens erect, distant, equal.

Leaves practically or quite sessile; spikes narrow and leafless, densely crowded.	
Spikes canescent....................................	*M. longifolia* 1.
Spikes not canescent................................	*M. rotundifolia* 2.
Leaves all more or less petioled.	
Flowers pedicellate, less crowded, in interrupted leafless spike-like clusters or terminal heads, some in the upper axils....................................	*M. piperita* 3.
Flowers in globular whorls or clusters, all in the axils of leaves, the uppermost axils rarely flower-bearing.	
Upper leaves scarcely reduced......................	*M. arvensis* 4.
Upper leaves conspicuously reduced..................	*M. Cardiaca* 5.

1. **M. longifolia** (L.) Hudson. (*Spearmint.*) Low, finely pubescent; leaves ovate-oblong to oblong-lanceolate, sharply serrate; spikes

rather slender; flowers white or purplish. (*M. spicata* and *M. sylvestris* L.)—In fields and roadside ditches, occasional throughout. Nat. from Eu. July-October.

2. **M. rotundifolia** (L.) Hudson. (*Apple Mint.*) Low, soft-hairy or downy, the leaves rugose, coarsely crenate-toothed, broadly elliptical to round-ovate, heart-shaped; spikes slender; corolla white or purplish. —A European weed naturalized at Gibson and Clarke. Summer.

3. **M. piperita** L. (*Peppermint.*) Low, very pungent, glabrous; leaves acute, sharply serrate, oblong-lanceolate to ovate-oblong; spikes loose at length; calyx glabrous below, but the teeth hirsute; corolla whitish or purplish.—An often cultivated European plant, nat. in backwaters of Trail Creek, outskirts of Michigan City. Summer, autumn.

4. **M. arvensis** L. var. **canadensis** (L.) Briquet. (*American Mint.*) Stem freely branching, retrorse-pubescent, at least on the angles, with fine hairs; leaves lanceolate to oblong-lanceolate, wedge-shaped at base, pubescent, closely serrate, the lower ones distinctly petioled; corolla white, pink, or violet.—In wet copses and in streams, Calumet River system and Dune Creek. Summer and autumn.

5. **M. Cardiaca** Gerarde. Branches ascending; stem tall; leaves lanceolate, sharply serrate. (*M. sativa* of Am. auths., not L.)—Nat. from Eu., wet meadows, Tremont (acc. to Churchill).

NIGHTSHADE FAMILY (Solanaceae)

Our species herbs with watery juice and alternate leaves, and regular flowers, the persistent sepals 5, the corolla of 5 united petals bearing the 5 (sometimes unequal) stamens; ovary free from the calyx, bearing a single style and stigma; fruit a capsule or berry, generally 2-celled, rarely 3-5-celled. Distinguished from the *Scrophulariaceae* chiefly by the regular, plaited corolla.

Foliage rank-scented; fruits often poisonous.

Fertile stamens 4; one small aborted stamen present........ *Petunia* 4.
Fertile stamens 5; no small aborted stamen present.
- Corolla more or less wheel-shaped or slightly funnelform; fruit a berry, but sometimes concealed in a prickly calyx.
  - Anthers converging, opening by chinks at the tip....... *Solanum* 1.
  - Anthers separate, opening lengthwise................ *Physalis* 2.
- Corolla with a very long tube; fruit a prickly, bur-like, dry capsule...................................... *Datura* 3.

1. SOLANUM L. Nightshade

Larger leaves often accompanied by smaller lateral ones, the peduncles also chiefly lateral; stamens exserted; filaments very short, the approximate anthers appearing to form a tube over the style.

Commonly cultivated species are *Solanum tuberosum* L., the potato, with branching and somewhat decumbent stem, without prickles, and unequally and interruptedly pinnatifid leaves, and white flowers, and

Solanum Melongena L., the eggplant, with smooth prostrate stems and large cordate leaves and very large, white or purple, egg-shaped fruits subtended by the calyx.

Stems not prickly; anthers blunt; flowers and globose naked berries small.	
Flowers blue or purple; berries red	*S. Dulcamara* 1.
Flowers white; berries black	*S. nigrum* 2.
Stems more or less prickly; anthers tapering upward; pubescence stellate.	
Corolla violet or white; anthers equal; fruit naked	*S. carolinense* 3.
Corolla yellow; lowest anther much the longest; fruit covered by the spiny calyx and appearing like a bur	*S. rostratum* 4.

1. **S. Dulcamara** L. (*Bittersweet.*) Climbing or twining perennial, more or less pubescent, with heart-shaped ovate leaves, the upper halberd-shaped, with 2 ear-like lobes or leaflets at the base; flowers in small cymes; berries ovoid.—In waste ground and around dwellings, also frequent in cool woods and on tamarack bogs as though native. Nat. from Eu. June-September. Plant poisonous throughout.

2. **S. nigrum** L. (*Common Nightshade.*) Chiefly glabrous, the stem rough on the angles; annual, spreading and much branched; leaves ovate, not lobed, wavy-toothed; flowers drooping in lateral small umbel-like clusters; berries globular.—In shaded and rich open grounds, also on tamarack bogs. July-September. Poisonous.

3. **S. carolinense** L. (*Horse Nettle.*) Plant perennial, low, densely beset with 4-8-rayed pubescence, or hirsute, and with long stout yellowish prickles; leaves ovate or oblong, sinuate-toothed or somewhat pinnatifid; flowers in lateral racemes.—Waste grounds, roadsides, and sandy soil, as if introduced. June-September. Probably poisonous.

4. **S. rostratum** Dunal. (*Buffalo Bur.*) Low, very prickly annual; pubescence generally stellate and hoary; leaves 1-2-pinnatifid; styles and stamens declined.—A weed of the Great Plains spreading eastward; on railroad embankments of the Calumet District. Summer.

2. PHYSALIS L. Ground Cherry

Low plants with calyx enlarging and reticulated after flowering and finally much inflated and surrounding the 2-celled globular edible berry; corolla with a short tube marked with 5 concave spots at the base, its border slightly 5-lobed or almost circular and barely 5-10-toothed, greenish or yellowish white to dark yellow with dark center.

Leaves rounded or cordate at base; stems at base more or less reclining and diffuse.	
Plant glabrous or merely puberulent	*P. angulata* 1.
Plant strongly pubescent.	
Hoary-pubescent; annual	*P. pruinosa* 2.
Pubescent or tomentose and sticky but not hoary; perennial from a creeping rootstock	*P. heterophylla* 3.
Leaves narrowed at base; perennials with chiefly erect stems.	
Corolla dull yellow with brown center; berry yellow or greenish	*P. lanceolata* 4.
Corolla sulphur yellow with purplish spots; berry reddish	*P. virginiana* 5.

1. **P. angulata** L. Branching; leaves laciniately and irregularly toothed, ovate or ovate-oblong; pedicels very slender; corolla only 6-10 mm. broad, unspotted; fruiting calyx with truncate or sunken base, inflated, 10-angled, conical-ovoid, finally well filled by the enlarging greenish-yellow berry.—Native in the Middle West but in our area seemingly a railroad weed. Summer.

2. **P. pruinosa** L. Stem stoutish; leaves sinuate-dentate, thickish; calyx firm, pubescent, reticulate, in fruit ovoid and sunken at the base, heavily 5-angled.—On the railroad embankments of the Calumet District, probably nat. from the prairies outside our range.

3. **P. heterophylla** Nees. Leaves oblong and repand-dentate; corolla greenish yellow with brownish or purple center; calyx-lobes long-villous and triangular, shorter than the tube.—Sandy soil, around Michigan City, perhaps elsewhere.

4. **P. lanceolata** Michx. Hirsute-pubescent or nearly smooth; stems stiff, angled, from thick underground runners; leaves thick, rather rigid, with a few broad teeth or usually entire; calyx with its lobes triangular-lance-ovate, in fruit round-ovoid, not sunken at base, indistinctly 10-angled.—Frequent in open sand of the high dune country.

5. **P. virginiana** Mill. Villous; rootstocks fleshy; leaves narrowly ovate, entire or sometimes with a few broad teeth, thin; calyx with its lobes broadly lanceolate, in fruit pyramidal-ovoid, 5-angled, sunken at base.—A characteristic plant of the oak barrens, throughout.

3. DATURA L. Thorn Apple

Rank weeds with coarse stems, ovate leaves, and showy flowers produced from the axils of the branches; calyx prismatic or cylindrical, 5-toothed, separating above the base in fruit, the upper part then deciduous; corolla funnelform, with a large spreading 5-10-toothed plaited border; capsule globular, 4-valved; seeds large.

Very poisonous throughout, and pervaded by a bitter odor.

Stem green; corolla white; lower prickles of the capsule shorter	*D. Stramonium* 1.
Stem purple; corolla lilac; prickles of the capsules all equal	*D. Tatula* 2.

1. **D. Stramonium** L. (*Stramonium.*) Low; leaves dull, thick, sinuate-toothed, ovate.—Rare, waste ground around Miller. Nat. from Asia? Summer.

2. **D. Tatula** L. (*Jamestown* or *Jimson Weed.*) Taller.—Common around towns and farms. Nat. from Trop. Am.? Summer.

4. PETUNIA Juss.

Low soft straggling plants with entire leaves and solitary flowers; calyx deeply 5-parted; corolla funnelform or salverform, its tube sitting loosely in the calyx, its limb broad, 5-lobed, oblique; ovary small, 2-celled, with slender style.

1. **P. violacea** Lindl. (*Garden Petunia.*) Flowers rose-red or violet or white; corolla tube wide, limb short; calyx lobes linear.—Intr. from S. Am., cult., escaped and established at Dune Park., acc. to Pepoon.

FIGWORT FAMILY (Scrophulariaceae)

Our species herbs with alternate or opposite leaves and generally irregular flowers, or sometimes nearly regular; calyx 4-5-lobed, free from the ovary; corolla usually more or less 2-lipped, of 5 lobes, or, apparently, only 3 or 4; stamens various, sometimes 5, all anther-bearing, or more commonly only 2 or 4 with anthers, one or more being converted into sterile club-like or hairy staminodia, or sometimes reduced to glands or scales, or quite absent; style single; stigma entire or 2-lobed; fruit a 2-celled, many-seeded capsule.

- Fertile stamens 5.................................... *Verbascum* 1.
- Fertile stamens 4.
  - Rudiment of a fifth stamen present either as a gland or scale on the upper corolla lip, or as a thickish filament.
    - Sterile stamen a gland; flowers blue.................. *Collinsia* 2.
    - Sterile stamen not a gland; flowers not blue.
      - Sterile stamen scale-like on the upper corolla lip; flowers greenish-purple...................... *Scrophularia* 3.
      - Sterile stamen filament-like; flowers white.
        - Sterile stamen as long as the others; flowers pedunculate in thyrsoid panicles................ *Pentstemon* 4.
        - Sterile stamen shorter than the others; flowers nearly sessile in compact clusters................. *Chelone* 5.
  - Rudiment of a fifth stamen none.
    - Calyx 5-cleft.
      - Corolla tubular or bell-shaped.
        - Corolla markedly 2-lipped.
          - Corolla spurred.............................. *Linaria* 6.
          - Corolla spurless............................. *Mimulus* 9.
        - Corolla almost regular.
          - Anther sacs glabrous or with a few bristle-like hairs at the tip; stigma short, roundish; filaments dilated-flattened and pubescent.. *Seymeria* 10.
          - Anther sacs densely woolly on the surface; stigma linear, consisting of a line down each side of the tongue-like style; filaments slender, not dilated, more or less woolly.
            - Corolla yellow; capsule acute to acuminate; leaves petioled; stem stout, over 4 dm. tall................................ *Aureolaria* 11.
            - Corolla pink with red spots within; capsule rounded, with a small point at tip; leaves sessile; stem slender, usually low.
              - Stem retrorse-hispid; leaves lanceolate, usually ear-lobed at base; pedicels less than 1 mm. long; calyx lobes ovate, longer than the tube; anther-sac of 2 stamens shorter than those of the other 2; capsule broadly ovate, 10-13 mm. long; seeds veiny, with raised edges....... *Otophylla* 13.

Stem ascending-scabrous to glabrous; leaves linear to filiform, entire; pedicels over 1 mm. long; calyx lobes linear to subulate, slightly longer to much shorter than the tube; capsule globose to globose-ovoid, 3-7 mm. long; seeds closely veiny .... *Agalinis* 12.
Corolla salver-shaped, 5-cleft, purple or blue........ *Buchnera* 14.
Calyx not 5-cleft.
Calyx 4-cleft.................................. *Melampyrum* 16.
Calyx 1- or 2-cleft.
Plants with scarlet bract leaves................. *Castilleja* 18.
Plants without scarlet bract leaves.............. *Pedicularis* 17.
Fertile stamens 2, some sterile filaments sometimes present.
Flowers solitary in the axils; calyx 5-parted.
Sterile filaments extruded; flowers purplish........... *Ilysanthes* 8.
Sterile filaments very short or none; flowers white or yellow................................... *Gratiola* 7.
Flowers racemed or axillary; calyx 4- (rarely 3-5-) parted. *Veronica* 15.

1. VERBASCUM L. Mullein

Tall biennials with sessile, often decurrent upper stem leaves, 5-parted calyx, and 5-lobed corolla which is open or concave and scarcely irregular, the lobes broad and rounded; style flattened at the apex; capsule globular.

Plants densely woolly throughout; flowers in a long dense cylindrical spike .... *V. Thapsus* 1.
Plants not woolly, at most a little glandular-pubescent; flowers in a loose, relatively short raceme .... *V. Blattaria* 2.

1. **V. Thapsus** L. (*Common Mullein.*) Stem tall, stout, simple; leaves acute, oblong, their bases decurrent as wings on the stem; flowers yellow or rarely white; lower stamens usually beardless.—Common European weed, in fields, waste places, farmyards. June-October.

2. **V. Blattaria** L. (*Moth Mullein.*) Only 6-12 dm. tall, slender and glabrate, at least below; lower leaves petioled, the upper partly clasping, doubly serrate, oblong or lyre-shaped; corolla yellow; filaments all bearded with violet, woolly hairs.—This has been reported from Whiting (E. J. Hill) and may be looked for elsewhere, especially around towns. A pretty weed, nat. from Eu. June-August.

2. COLLINSIA Nutt. Blue-eyed Mary. Innocence

Slender annuals or biennials with umbel-like clusters of flowers whorled in the axils of the upper leaves; calyx deeply 5-cleft; corolla declined, 2-lipped, the upper lip 2-cleft, the lobes reflexed; capsule 4-many-seeded.

1. **C. verna** Nutt. 1.5-7 dm. tall, slender; lower leaves ovate, the upper clasping, ovate-lanceolate; flowers on long peduncles, about six to a whorl; corolla 1-1.5 cm. long, blue and white.—In moist soil of the Calumet District, according to E. J. Hill. April-June.

3. SCROPHULARIA L. Figwort

Coarse stiff slender rank herbs with small greenish-purple or yellowish flowers, the calyx 5-parted or -cleft, the corolla irregular, with globose to oblong tube, the limb 5-lobed, the upper 2 lobes longer and erect, the lateral ones ascending, the lower spreading or reflexed, the whole corolla somewhat quadrangular in appearance; capsule ovoid.

Inflorescence pyramidal, open; rudiment of a 5th stamen brownish-purple; capsule subglobose, thin	*S. marilandica* 2.
Inflorescence slender, elongated; rudiment of a 5th stamen yellowish; capsule ovoid-conic, thickish	*S. lanceolata* 1.

1. **S. lanceolata** Pursh. Perennial; rootstock knotted and square; stem square, 0.9-2.5 m. tall, puberulent below, sticky-glandular above, simple or somewhat branched; leaves short-petioled, ovate to lanceolate, acuminate at the apex, mostly narrowed at the base but sometimes subcordate, smooth on both sides when mature, usually large-toothed on the margin; upper lobes of the corolla broadly oblong, much longer than the others. (*S. pectinata* Raf.; *S. leporella* Bicknell.) —Common in oak barrens and damp woods throughout. May-September.

2. **S. marilandica** L. Similar to the preceding; 1-1.7 m. tall, with complicated rootstock system; glabrous except for the sticky inflorescence; leaves ovate to ovate-lanceolate, the teeth finer than in the preceding; upper lobes of the corolla nearly round, scarcely longer than the others.—In woods, rare, near Miller, perhaps elsewhere. July-September.

4. PENTSTEMON Schmidel. Beard-tongue

Perennials with opposite, entire or toothed leaves, the upper clasping by a sessile base; flowers in open, racemose panicles, or thyrsoid, showy; calyx 5-parted; corolla tubular, dilated in the throat, the upper lip 2-lobed, the lower 3-cleft; fertile stamens 4, the fifth sterile one naked or hairy, conspicuous; seeds numerous.

Throat of the corolla nearly closed by a densely bearded palate	*P. hirsutus* 1.
Throat of the corolla open, scarcely at all bearded.	
Corolla white, rather strongly inflated	*P. Digitalis* 3.
Corolla more or less violet-purple, moderately inflated	*P. laevigatus* 2.

1. **P. hirsutus** (L.) Willd. Stem 2-10 dm. tall, finely white-glandular-hairy; leaves lanceolate to oblong, the lowest and basal ones varying to ovate, usually small-toothed; corolla scarcely enlarged upward, dull violet or purple or partly white; sterile stamen densely bearded.—In dry soil, Clarke, according to Gates. May-July.

2. **P. laevigatus** Ait. 5-15 dm. tall; leaves firm and glossy, those of the stem clasping by a subcordate base, lanceolate or ovate-oblong; inflorescence an open thyrse; corolla 1.5-2.5 cm. long, white or tinged with purple, gradually enlarged upward, the throat somewhat widely open but the limb scarcely spreading; sterile filament thinly bearded at the tip. (*P. calycosus* Small; *P. Pentstemon* Britton.)—In moist soil of the Calumet Region (H. & R.). June, July.

3. **P. Digitalis** (Sweet) Nutt. 6-15 dm. tall; stem stout; lower leaves oval or oblong, narrowed to margined petioles; upper leaves clasping; corolla tube abruptly dilated, 2-3 cm. long, showy. (*P. laevigatus* var. Gray.)—A handsome species found along the electric line near Mineral Springs, in rich moist grassland (according to Robinson) and in moist prairies of the Calumet District (H. & R.). June, July.

5. CHELONE L. Turtlehead. Balmony

Smooth perennials with erect branching stems and serrate leaves, and spikes or clusters of large 2-lipped flowers, the mouth of the corolla only a little open, with broad arched upper lip and 3-lobed lower lip, woolly-bearded in the throat; seeds many.

1. **C. glabra** L. var. **linifolia** Coleman. Stem 0.5-2 m. tall; leaves thickish, dull dark green, narrowly lanceolate, gradually acuminate; teeth appressed; petiole very short; flowers white or tinged with rose. —Common in wet places, throughout. July-September.

6. LINARIA Hill. Toadflax

Herbs with racemes of spurred irregular 2-lipped flowers, the lower with a prominent palate; stamens 4, fifth stamen none; fruit a thin many-seeded capsule. Our species perennials, erect, with narrow, entire leaves and bright flowers.

Raceme dense; corolla 2-3 cm. long, yellow and orange......	*L. vulgaris* 1.
Raceme loose; corolla less than 1 cm. long, blue and white..	*L. canadensis* 2.

1. **L. vulgaris** Hill. (*Butter-and-eggs.*) Perennial, 1 m. high, or generally less, glabrous, leafy, the leaves linear, subalternate, pale sage green, sessile; slender spur darker than the pale yellow corolla with its orange palate. (*L. Linaria* Karst.)—Common, fields, roadsides, and waste places; a handsome weed introduced from Europe. Summer.

2. **L. canadensis** (L.) Dumont. Annual or biennial 2-8 dm. tall, very slender and strictly erect, glabrous; leaves short and slender, a rosette of leaves sometimes found at the base; palate of the flowers white; corolla sometimes absent in reduced later flowers which are self fertilized in bud.—Occasional in sandy places, throughout; probably both native and adventive from the east as a weed, as it occurs along railroad tracks at Dune Park.

7. GRATIOLA L. Hedge Hyssop

Low perennial or annual plants with sessile leaves and somewhat succulent stems; 2 bractlets at the base of the equally cleft calyx; corolla 2-lipped, the upper lip entire or 2-cleft, the lower 3-cleft; fruit a many-seeded capsule. In our species the stems are diffusely branched and often creeping at base, the bractlets equalling the calyx, the anthers with a broad connective; sterile filaments minute or none.

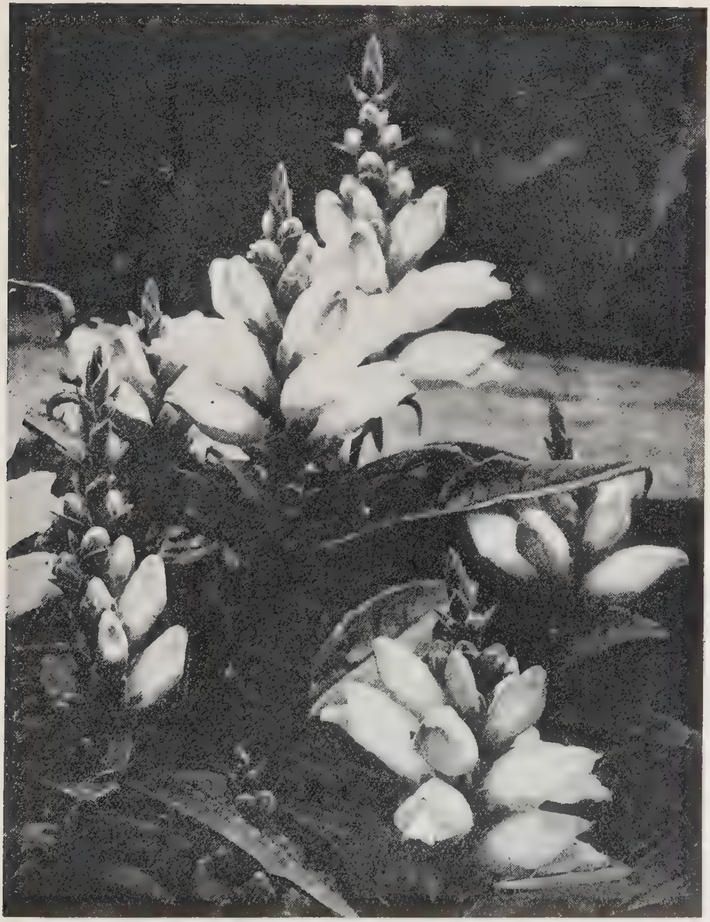


FIG. 30. TURTLEHEAD (*Chelone glabra*)

Plants 1-4 dm. tall; corolla at least in part whitish; fruit on peduncles as long as or longer than the calyx........	*G. virginiana* 1.
Plants 0.5-1 dm. tall; corolla all yellow; fruit nearly sessile...	*G. mesochora* 2.

1. **G. virginiana** L. 1-3 dm. tall, clammy-puberulent above; leaves mostly entire, acute, lanceolate; peduncles 1-2.5 cm. long; pod 4-5 mm.

long. (*G. sphaerocarpa* and *megalocarpa* Ell.)—Wet sandy ditches, occasional throughout. Summer.

2. **G. mesochora** Peattie. Stem slender, smooth; leaves only about 5, mostly entire or obscurely repand and narrowed to a bluntish tip, rarely somewhat spatulate and toothed at the tip; corolla bright yellow throughout, 7 mm. long; calyx 2-3 mm. long, the teeth deltoid; pod broad, often broader than long, not over 5 mm. long, mostly sessile.—In ponds and lagoons, Pine. Possibly an autumnal phase of the foregoing.

8. ILYSANTHES Raf. False Pimpernel

Small, smooth annuals with purplish flowers on slender pedicels; corolla 2-lipped, the upper lip erect, 2-lobed, short, the lower 3-cleft, spreading, large; a pair of antherless stamens present; capsule ovoid or ellipsoid, many-seeded. Late in the season small cleistogamous flowers are sometimes produced.

1. **I. dubia** (L.) Barnhart. Stems 1-3 dm. long, erect, leafy; leaves crenate-toothed, ovate, rounded, or oblong, the lower narrowed at base, the upper clasping; calyx lobes linear, as long as the pod; corolla 5-10 mm. long; lower peduncles not longer than the subtending leaves. (*I. gratioloides* Benth.)—Occasional in wet places of the Calumet District. Summer.

9. MIMULUS L. Monkey Flower

Leaves opposite or whorled; calyx 5-angled and -toothed, prismatic; lower corolla lip spreading, 3-lobed, the upper erect or reflexed, 2-lobed; stigma 2-lobed; seeds numerous.

Leaves oblong or lanceolate, heart-shaped, with 1 principal nerve	*M. ringens* 1.
Leaves roundish or kidney-shaped, with several principal nerves	*M. glabratus* 2.

1. **M. ringens** L. Square-stemmed, erect, glabrous perennial 1 m. or less tall; leaves clasping, pointed; peduncles longer than the flower; corolla throat closed by a prominent palate, 2-4 cm. long, violet blue or rarely white.—Frequent throughout in wet places, especially along streams in mucky soil. Summer.

2. **M. glabratus** HBK. var. **Jamesii** (T. & G.) Gray. Stem creeping at base, diffusely spreading, smoothish; calyx ovoid, oblique, inflated in fruit; corolla throat broadly open; flowers yellow.—Rare in wet places, Miller (acc. to H. & R.), a western prairie species. Summer.

10. SEYMERIA Pursh. Mullein Foxglove

Erect herbs with dissected or pinnatifid leaves, the uppermost bract-like and alternate; flowers in interrupted spikes, yellow; calyx deeply 5-cleft; corolla tube short and broad; lobes 5, spreading, nearly regular.

1. **S. macrophylla** Nutt. 1-1.3 m. tall, pubescent; leaves large, the lower pinnately divided and again pinnatifid and incised; corolla tube incurved, very woolly within; filaments woolly at base; capsule many-seeded, ovoid, pointed. (*Afzelia* Nutt.)—Thickets near Wolf Lake (acc. to Hill). Summer.

11. **AUREOLARIA** Raf. Yellow False Foxglove

Erect branching plants with large, incised or pinnatifid, mostly opposite stem-leaves, at least the lower, the uppermost bract-like, subtending the 1-flowered peduncles; flowers yellow, the tube densely woolly inside, as are the stamens; anthers alike, awn-pointed at base; corolla expanding above, the lobes nearly equal or some slightly larger; anthers approaching by pairs; style elongated, enlarged and flattened at the tip.

Corolla pubescent outside; pubescence of the plant partly glandular	*A. pedicularia* 1.
Corolla smooth outside; no glandular pubescence.	
Stems closely and finely pubescent	*A. grandiflora* 2.
Stems glabrous	*A. flava* 3.

1. **A. pedicularia** (L.) Raf. var. **ambigens** (Fernald) Farwell. Annual or biennial, much branched, up to 1 m. tall, very leafy; stems glandular-villous above, as are the pedicels and calyx; leaves pinnatifid, the lobes cut and toothed; corolla yellow externally, more or less tinged with reddish within, at times somewhat purple-spotted, large and showy. (*Gerardia pedicularia* L. var. Fernald.)—A characteristic plant of the edges of dune swales and oak barrens, Mineral Springs, west to Hammond, and sometimes eastward to Michigan City. Summer.

2. **A. grandiflora** (Benth.) Farwell. Perennial, much branched, 0.5-1 m. tall, minutely downy; leaves pinnatifid or deeply cut; pedicels shorter than the calyx; corolla 4-5 cm. long; capsule glabrous. (*Gerardia* Benth.)—In open oak woods, Miller and perhaps elsewhere. Summer.

3. **A. flava** (L.) Farwell. Stem glaucous; lower leaves pinnately cut, the lowest somewhat bipinnatifid; pedicel and calyx externally glabrous; corolla 4-5 cm. long. (*Gerardia virginica* of auths., not *Rhinanthus virginica* L.; *A. glauca* Raf.)—Common, oak barrens and beach ridges, and dune meadows. Summer.

12. **AGALINIS** Raf. Purple False Foxglove

Our species low, slender-stemmed annuals with entire, narrow, rough leaves, and rose-pink flowers, red-spotted within, a little irregular; stamens hairy. Plants usually blackening in drying, probably semi-parasitic at least at first.

Corolla hairy, at least on the margins; pedicels as long as or shorter than the flowers.	
Flowers bright, very hairy within, large, 2.6-3 cm. long	*A. purpurea* 2.
Flowers pale, sparsely hairy, small, 1.5-2.5 cm. long.	

Flowers 1.8-2.5 cm. long; capsule ellipsoid, longer than thick.. *A. aspera* 1.
Flowers 1.5-1.8 cm. long; capsule subglobose........... *A. paupercula* 3.
Corolla smooth within, 1-1.5 cm. long; pedicels longer than the corolla; anthers woolly; capsule globose.
Leaves flat; corolla bright.............................. *A. tenuifolia* 4.
Leaves very slender, inrolled; corolla pale............... *A. Skinneriana* 5.

1. **A. aspera** (Dougl.) Britton.—Sandy soil of the Post-Tolleston beaches. Late summer and autumn. (*Gerardia* Dougl.)

2. **A. purpurea** (L.) Pennell. With long, wide-spreading, flexuous branches, 3-8-flowered, the flowers showy. (*Gerardia* L.)—Abundant in sandy fields, dune meadows, and moist swales from Wolf Lake and the Post-Tolleston beaches throughout the high dune country. Late summer and autumn.

3. **A. paupercula** (Gray) Britton. Scarcely branched, slender, inconspicuous. (*Gerardia* Britton.)—Moist meadows between the Post-Tolleston beaches and eastward in the dunes. Summer.

4. **A. tenuifolia** (Vahl) Raf. Leaves narrowly linear, acute; calyx teeth very short, acute. (*Gerardia* Vahl.)—Meadows and swales, Post-Tolleston beaches to Dune Park. Late summer and autumn.

Var. **macrophylla** (Benth.) Blake. Stouter, with larger leaves (4-5 mm. broad); calyx teeth larger; pedicels ascending.—Occasional from Roby to Michigan City. Late summer and autumn.

Var. **parviflora** (Nutt.) Pennell. Branches ascending; axillary fascicles of leaves conspicuous; calyx teeth very small.—Common from Roby along the old beaches to and through the high dune country.

5. **A. Skinneriana** (Wood) Britton. Slender, stiff, inconspicuous. (*Gerardia* Wood.)—Prairie region north to Pine. Summer.

13. OTOPHYLLA Bentham. Purple False Foxglove

Resembling *Agalinis*, but the corolla and very unequal filaments always smooth within; anthers dissimilar, pointless, glabrous or sparingly hairy. Low inconspicuous plants.

1. **O. auriculata** (Michx.) Small. Slender, simple, rough; leaves entire or with one lobe on each side; flowers purple, 1. 5-2 cm. long, sessile in the axils. (*Gerardia* Michx.)—On prairies between Griffith and Dyer. Autumn.

14. BUCHNERA L. Blue Hearts

Perennial, rough-hairy, semi-parasitic plants blackening in drying; leaves opposite, at least the lower; flowers in a terminal spike, each flower 2-bractleted, opposite; corolla almost regular; anthers 1-celled; capsules 2-celled, many-seeded.

1. **B. americana** L. Stem slender, straight; leaves veiny, sparingly toothed; spikes interrupted; corolla (phlox-like) 2 cm. long, deep purple.—Low sandy margins of sloughs between the Post-Tolleston beaches. June-August.

15. VERONICA L. Speedwell

Our species herbs with sky-blue or white flowers, the lateral lobes of the corolla narrower than the others, or sometimes the lowest lobe narrower; stamens exserted, one on each side of the upper corolla lobe; capsule usually flattened, 2-celled, notched or truncate at apex.

Tall, long-leaved plants; flowers in showy racemes; corolla salverform	*V. virginica* 1.
Low, small-leaved plants; flowers tiny, scattered among the leaf-axils; corolla open.	
Perennials with opposite leaves and pale blue flowers.	
Leaves lanceolate and clasping	*V. glandulifera* 2.
Leaves linear, merely sessile	*V. scutellata* 3.
Annuals with white flowers and alternate leaves	*V. peregrina* 4.

1. **V. virginica** L. (*Culver's Root.*) Straight, simple stem up to 2 m. tall; leaves in whorls of 4 or more, lanceolate; spikes panicled; corolla small, but the spikes showy, nearly white, the lobes longer than the tube; stamens much exserted. (*Leptandra* Nutt.; *Veronicastrum* Farwell.)—Rich meadows and prairies, infrequent within our borders, Dyer, East Gary, Michigan City. July.

2. **V. glandulifera** Pennell. (*Water Speedwell.*) Creeping, rooting at base, erect at tip; rachis and pedicels glandular-hairy; raceme 25-50-flowered. (*V. Anagallis-aquatica* of auths., not L.)—Submerged plant, creeks and ditches, Port Chester, Mineral Springs. Summer.

3. **V. scutellata** L. (*Marsh Speedwell.*) Stems weak; racemes slender, zigzag, several; flowers few, on long pedicels.—In tall wet grass, East Chicago to Michigan City. Summer.

4. **V. peregrina** L. (*Neckweed.*) Glandular-puberulent, erect, branched; leaves oval-oblong, thickish, the upper narrower; flowers sessile.—Inconspicuous, weed-like, Calumet District, in dune marshes to Michigan City. Summer.

16. MELAMPYRUM L. Cow Wheat

Erect branching annuals with opposite leaves; flowers solitary in the upper axils; calyx bell-shaped; corolla with cylindrical tube enlarged at the throat, and upper lip compressed and straight, the lower erect-spreading, 3-lobed, biconvex; capsule 1-4-seeded.

1. **M. lineare** Lam. var. **latifolium** (Muhl.) Beauv. Low, slender; main stem-leaves linear-lanceolate to nearly ovate; bracts fringed; calyx teeth not half as long as the pale greenish or purplish corolla which is 1 cm. long.—A characteristic little plant of oak woods and dune meadows. Summer.

17. PEDICULARIS L. Lousewort

Perennials with pinnatifid leaves; flowers in a spike; corolla strongly 2-lipped, the upper lip flattened, the lower erect, 2-crested, 3-lobed; capsules oblique, several-seeded.

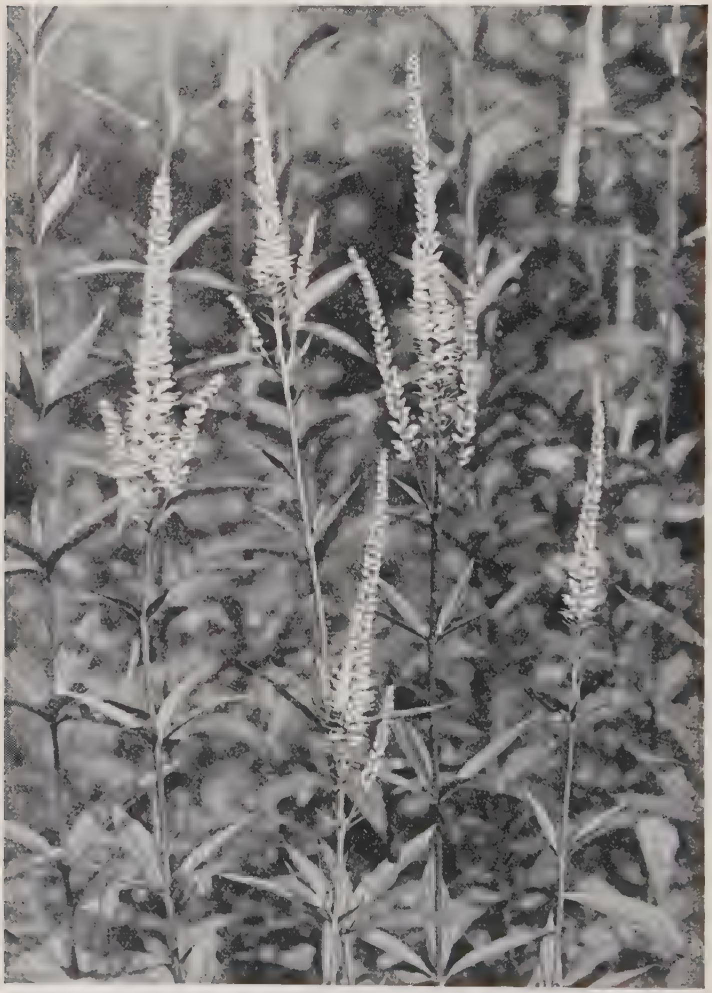


FIG. 31. CULVER'S ROOT (*Veronica virginica*)

Leaves scattered; calyx a little cleft; upper lip of the corolla hooded, incurved, 2-toothed under the apex.........	*P. canadensis* 1.
Leaves opposite; calyx distinctly 2-parted; upper lip of the corolla merely incurved and bearing a short truncate beak...	*P. lanceolata* 2.

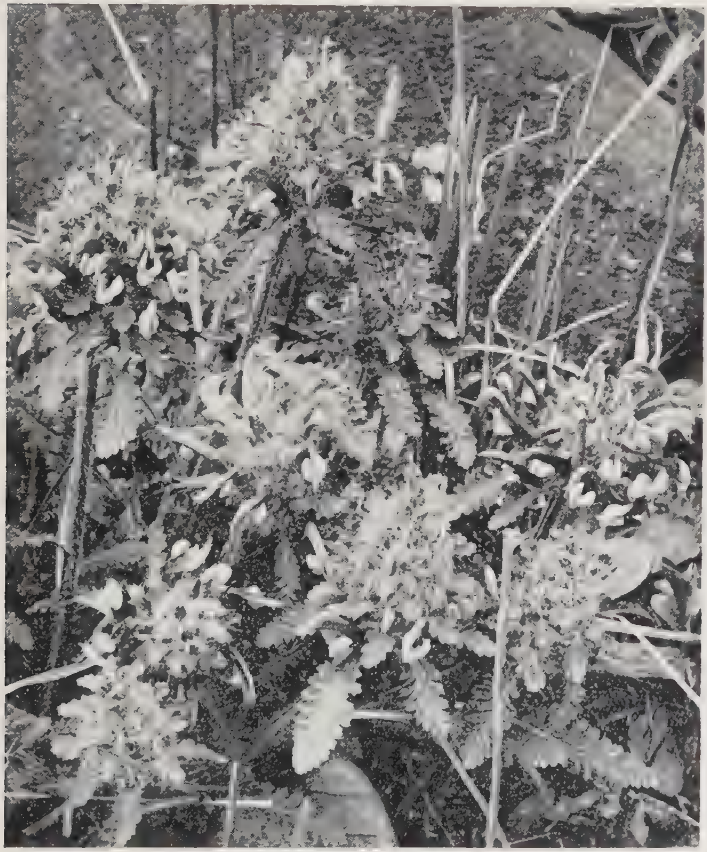


FIG. 32. WOOD BETONY (*Pedicularis canadensis*)

1. **P. canadensis** L. (*Wood Betony.*) Stems clustered, 1.5-4 dm. tall; lowest leaves pinnately parted; spikes short and dense; corolla

dull greenish yellow with internal crimson splashes; capsules flat, sword-shaped.—Common in the oak woods and in the prairie region. Summer.

2. **P. lanceolata** Michx. (*Swamp Betony.*) Stems smooth, mostly solitary; leaves doubly cut-toothed; spikes crowded but often long; corolla pale yellow throughout; lower lip erect, nearly closing the throat of the flower; capsule ovate.—Swampy ground, marshes, and streams, Calumet River to Trail Creek.

18. CASTILLEJA Mutis. Painted Cup

Parasitic herbs with alternate leaves, those of the inflorescence brilliantly colored and more conspicuous than the yellowish or reddish corolla which has a much compressed upper lip; calyx 2-cleft.

1. **C. coccinea** (L.) Spreng. Hairy annual with simple stem and clustered root leaves; floral leaves 3-cleft, scarlet near the summit or sometimes yellow; corolla pale yellow.—Rare, or at least sporadic and ephemeral, Roby, Clarke, and Pine, in low sandy ground; rare in dune meadows. Late spring.

BUTTERWORT FAMILY (Pinguiculaceae)

Small herbaceous plants with 2-lipped calyx and 2-lipped corolla, the lower lip 3-lobed with a prominent palate nearly closing the throat of the flower and bearing behind a spur; stamens 2; anthers 1-celled; ovary 1-celled, free from the calyx; style short or none; stigma 1-2-lipped; fruit an irregularly bursting capsule.

Curious insectivorous plants, growing in water, on mud or dripping cliffs, or in wet grass.

1. UTRICULARIA L. Bladderwort

Rooting or free-floating herbs; leaves none, or linear-dissected, or aerial and entire; aquatic species provided with float-bladders; flowers solitary or in few-flowered racemes on slender naked stems. Propagation often by winter buds.

Aquatic, the flowering stalks arising from branching stems; air bladders often many.	
Flowers yellow; fruiting pedicels recurved.	
Leaves numerous, crowded; corolla closed.............	*U. macrorhiza* 1.
Leaves scattered; corolla gaping.....................	*U. minor* 2.
Flowers yellow or purple; fruiting pedicels erect.	
Flowers yellow.	
Corolla 1 cm. or more broad; leaves crowded, 4-5 times forked	*U. intermedia* 3.
Corolla about 5 mm. broad; leaves fewer, little divided.	*U. gibba* 4.
Flowers violet-purple...............................	*U. purpurea* 5.
Flowering stalks from a base rooting in mud or soil; air bladders few or none.	

Flowers purple, solitary; leaves sparingly lobed.......... *U. resupinata* 6.
Flowers yellow, usually 2 (1-5); leaves entire............ *U. cornuta* 7.

1. **U. macrorhiza** LeConte. Stems often very long, floating just beneath the surface; scapes 1-3 dm. tall, bearing 5 to 12 flowers; spur slender, acute. (*U. vulgaris* of auths., not L.; *U. vulgaris* var. *americana* Gray.)—Common in sloughs and ponds, especially Wolf Lake and the Calumet River. May-August.

2. **U. minor** L. Stems short, creeping on the bottom in shallow water; scapes weak, solitary, 2-8-flowered; corolla gaping; bladders few.—Inconspicuous rare plant, known only from lagoons at Pine. May-July.

3. **U. intermedia** Hayne. Stem creeping on the bottom in shallow water; scapes solitary, 1-4-flowered; bladders few.—Rare, known only from shallow lagoons and pools at Pine. May-July.

4. **U. gibba** L. Stems creeping on the bottom in shallow water; scapes 1-4-flowered.—A very small-flowered species, frequent in our area, Wolf Lake to Dune Park, dune marsh, Tamarack Sta.

5. **U. purpurea** Walt. Stems long, floating near the surface; scape stoutish, 2-4-flowered; corolla large and showy with a yellow spot near the base of the lower lip; bladders numerous. (*Vesiculina* Raf.)—A beautiful species, lagoons and lakes and rivers, Pine to Dune Park, dune marsh, Tamarack Sta. A coastal plain species.

6. **U. resupinata** B. D. Greene. Stem 0.5-2 dm. tall, 2-bracted; leaves thread-like, confined to the creeping branches; flower at right angles to the scape; corolla 1 cm. long; lower lip longer than the slender spreading obtuse spur. (*Lecticula* Barnhart.)—A striking little species rooting in mud or grassy margins of lakes and rivers. Wolf Lake and in the Calumet River. August.

7. **U. cornuta** Michx. Stem 0.5-3 dm. tall; flowers sessile; corolla 1.5-2 cm. broad; lower lip large, helmet-shaped, with strongly reflexed sides; spur turned downward, outward. (*Stomoisia* Raf.)—A striking little plant on account of its usually leafless condition and its large, curious, brilliant, fragrant flowers. Edges of sloughs, lakes and rivers, but not aquatic, Wolf Lake and the muds of the Calumet River, also sloughs of the Post-Tolleston beaches. August.

BROOM-RAPE FAMILY (Orobanchaceae)

Low fleshy parasitic herbs without chlorophyll, the plants generally yellowish or brownish; leaves reduced to mere scales; flowers solitary or spiked; calyx 4-5-toothed, persistent; corolla tubular, 2-lipped; stamens 4, on the corolla tube; ovary free, ovoid, with long style and large stigma; capsule 1-celled; seeds numerous, minute.

Upper flowers male with tubular corolla; lower flowers female with minute, non-expanding corolla................ *Epifagus* 1.
Flowers all alike and perfect.
  Flowers solitary on long naked peduncles; calyx 5-cleft; stamens not exposed.......................... *Orobanche* 2.
  Flowers in a scaly, thick spike; calyx cleft deeply in front; stamens exserted............................ *Conopholis* 3.

1. EPIFAGUS. Nutt. Beech-drops

Wiry, much-branched, yellowish-brown plants with small scattered scales for leaves; flowers racemed or spiked; the 2-valved capsule forcing the female corolla off as it grows.

1. **E. virginiana** (L.) Bart. 1-6 dm. tall; habit almost fungoid; upper flowers having a style but really sterile, 1 cm. long, curved, 4-toothed, whitish or purplish. (*Leptamnium* Raf.)—Parasitic on beech roots, around Tremont, and beyond Michigan City. August-October.

2. OROBANCHE L. Broom-rape

Plants brownish, purplish or gray; flowers in our species solitary on long naked scapes; corolla with a long curved tube, the border 5-lobed; stigma broadly 2-lipped or crateriform.

True stem subterranean, short, scaly; calyx-lobes lance-awl-shaped	*O. uniflora* 1.
Stem erect, scaly; calyx lobes triangular	*O. fasciculata* 2.

1. **O. uniflora** L. (*Cancer Root.*) Rootstock branched, sending up several scapes which are 0.5-2 dm. tall and bear but one conspicuous, curved, horizontal or oblique corolla mostly pale blue, yellow-bearded in the throat, only twice as long as the calyx. (*Aphyllon* Gray; *Thalesia* Britton.)—Parasitic on various roots, in woods near the Lake shore. April-July.

2. **O. fasciculata** Nutt. 0.5-1 dm. tall; peduncles clustered; corolla several times longer than the calyx, with rounded lobes. (*Aphyllon* Gray; *Thalesia* Britton.)—Parasitic on *Artemisia*, local. A far-western species reaching an eastern limit here. April-August.

3. CONOPHOLIS Wallr. Squaw-root. Cancer-root

Stout, simple, glabrous, densely scaly, low, light brown herb, parasitic on the roots of trees and without chlorophyll, its yellowish flowers 2-bracteolated under the split on the lower side, 3-4-toothed on the upper; corolla nearly erect, concave, fringed, 3-lobed below, and spreading; stamens exserted; anthers bristly-pubescent; capsule ovoid-globose.

1. **C. americana** (L. f.) Wallr. 7-25 cm. tall, from a thickened base, and usually clustered, densely scaly all over.—A singular plant, blackening in drying, having a fungoid odor, and turning hard when old; in form it much resembles a pine cone. Very rare, in low dune woods, Keiser and Tremont. Spring and summer.

PLANTAIN FAMILY (Plantaginaceae)

Leaves all basal; flowers in spikes, mostly regular and 4-merous; stamens inserted on the tube of the dry, papery, veinless corolla. Pollinated by wind.

1. PLANTAGO L. Plantain

Our species mostly homely, weed-like herbs with leaves generally having several ribs from the base; flowers small, on long scapes, in a spike or head, whitish; sepals persistent; stamens 4 or 2, the filaments long, weak; style filiform like the hairy stigma; fruit a 2-celled capsule, from which the tip falls off like a lid.

Leaves linear	*P. aristata* 4.
Leaves lanceolate or broader.	
Leaves cordate at base, ovate.	
Petioles green at base; seeds angled, reticulated	*P. major* 1.
Petioles purple at base; seeds oval, not reticulated	*P. Rugelii* 2.
Leaves narrowed at base, lanceolate	*P. lanceolata* 3.

1. **P. major** L. Leaves thick and leathery, the broad petiole channeled; scapes usually curved-ascending; spikes dense.—Cosmopolitan weed. Urban region of the Calumet District. Elsewhere rare; often confused with the following. Early summer.

2. **P. Rugelii** Dcne. Similar, but leaves thinner and paler; spikes long and thin; sepals acutely keeled on the back.—Common in woods, around marshy grass and meadows, etc., not so prevalent in waste and weedy places as the preceding. Summer.

3. **P. lanceolata** L. (*Rib Grass.*) Hairy; long scapes grooved; spikes at first in short dense heads, at length cylindrical; seeds hollowed on the face.—Bad and common Eu. weed, with rather conspicuous flowers. June, July; second blooming in autumn.

4. **P. aristata** Michx. Silky or woolly or glabrous annual with flowers of 2 sorts as respects length of anthers and filaments, on different plants; corolla lobes persistent, spreading, broadly rounded; seeds boat-shaped; bracts longer than the flowers.—Prairies of the Calumet District, rare; a western plant; perhaps only a railroad weed.

MADDER FAMILY (Rubiaceae)

Leaves opposite, entire and connected by stipules, or in whorls without stipules; corolla regular, 4-5-lobed, bearing the 4-5 stamens; calyx adherent to the 2-4-celled ovary.

Shrubs, with flowers in large ball-like heads	*Cephalanthus* 3.
Herbs with small, solitary or cymose flowers.	
Corolla wheel-shaped or with very short tube	*Galium* 4.
Corolla funnelform or salverform.	
Creeping herbs with evergreen leaves and each pair of flowers more or less united	*Mitchella* 2.
Erect; leaves deciduous; flowers separate, solitary or in cymes	*Houstonia* 1.

1. HOUSTONIA L. Bluets

Delicate plants with peduncled flowers; calyx and corolla 4-lobed; style 1, stigmas 2; fruit a top-shaped pod with deciduous lid-like cap; seeds pitted.

Peduncles 1-flowered; flowers salverform	*H. coerulea* 1.
Flowers in cymes, funnelform.	*H. ciliolata* 2.

1. **H. coerulea** L. (*Innocence, Quaker-ladies.*) Leaves spatulate, very small; stems low, slender, sparingly branched; flowers sky blue with yellow eye, or sometimes white or lilac.—Wet grasslands and prairies, flats of the Little Calumet and occasional throughout. Early spring.

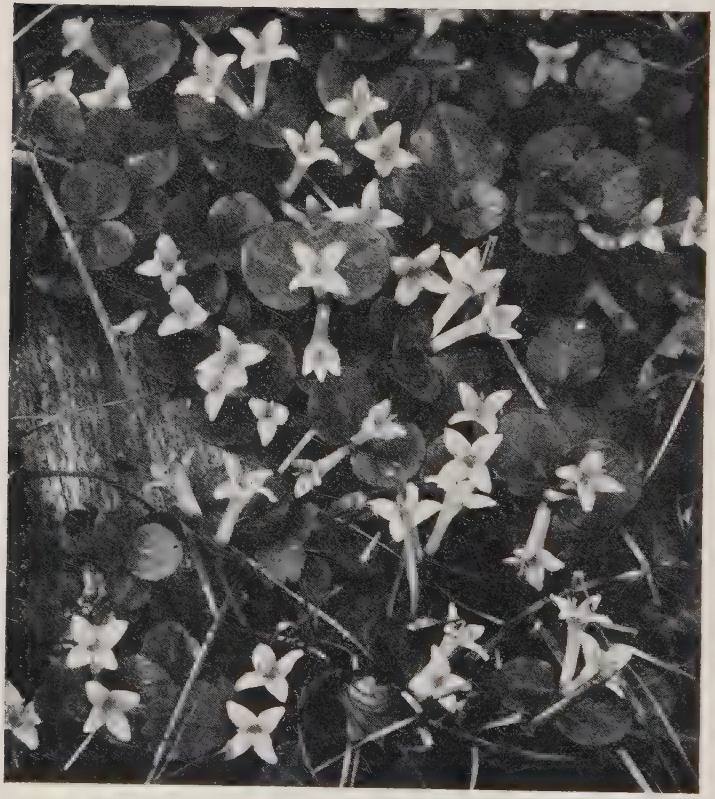


FIG. 33. PARTRIDGE BERRY (*Mitchella repens*)

2. **H. ciliolata** Torr. Stems 1-2 dm. tall; leaves thickish, 1-2 cm. long, at least the basal rosette leaves ciliate; corolla hairy within, white

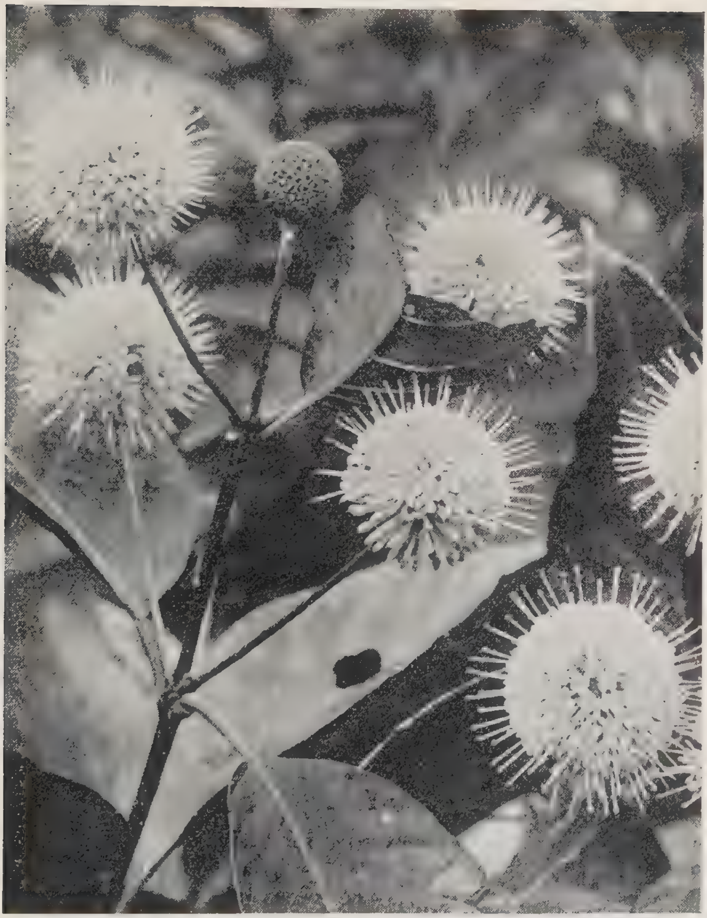


FIG. 34. BUTTONBUSH (*Cephalanthus occidentalis*)

2. **MITCHELLA** L. Partridge Berry

to purplish, not sky blue. (*H. canadensis* Willd.)—In dry ground, Hessville, according to Hill; perhaps elsewhere. Summer.

Smooth, trailing; leaves shining, petioled; ovaries of the pairs of flowers united, forming a berry-like double drupe in fruit; calyx and corolla 4-lobed, the latter salverform; calyx teeth persistent on the fruit.

1. **M. repens** L. Leaves roundish, dark green; flowers white or pink, fragrant, bearded inside; fruit scarlet.—Mossy woods, especially conifers, and marshy stump lands, in the high dune country only. Flowers in spring smelling as sweet-birch; fruit in summer, edible but tasteless, much eaten by birds, lasting all winter.

3. CEPHALANTHUS L. Buttonbush

Flower heads dense, peduncled; calyx-tube an inverted pyramid, with 4 lobes; corolla funnelform, 4-lobed; fruit splitting from the base into 2-4 closed and 1-seeded portions.

1. **C. occidentalis** L. Shrub 1-3 m. tall, with thin light bark and thick pith; leaves petioled, glabrous, opposite or in whorls of 3, shining above, ovate or lanceolate-oblong, long-pointed.—Very common around swamps and bogs, and even in merely damp fields. July-August.

Var. **pubescens** Raf. Lower leaf surfaces and branchlets softly pubescent.—Miller and probably elsewhere.

4. GALIUM L. Cleavers. Bedstraw

Slender, usually sprawling, square-stemmed herbs with small, generally white flowers in stiff-branched cymes; calyx teeth obsolete; stamens 4 or 3, short; styles 2; fruit twin, separating into 2 seed-like carpels, dry or fleshy. Roots often yielding a red stain.

Erect plants; neither stems nor leaves retrorsely scabrous.	
Flowers numerous in compact panicles, bright white; fruit minutely bristly	*G. boreale* 4.
Flowers in loosely 1-several-flowered cymes, greenish.	
Fruit smooth or only a little glandular-roughened.	
Stem more or less pubescent	*G. circaezans* 3.
Stem smooth	*G. tinctorium* 7.
Fruit hispid	*G. pilosum* 2.
Matted, reclining, sprawling, or ascending plants, often with retrorsely scabrous stems or leaves.	
Fruit smooth or merely rough-glandular.	
Leaves acute, slightly upwardly scabrous on the margins	*G. concinnum* 9.
Leaves obtuse.	
Stems retrorsely scabrous; corollas greenish-white 1.5 mm. or less broad.	
Flowers solitary; pedicels curved, scabrous	*G. trifidum* 5.
Flowers in twos or threes; pedicels straight, smooth.	*G. Claytoni* 6.
Stems smooth; corollas white, 2-2.5 mm. broad; fruit 1-1.5 mm. in diameter	*G. labradoricum* 8.
Fruit bristly.	
Hairy annual; stem with relatively long, hooked prickles on the angles; leaves not rigid-pointed or fragrant in drying	*G. Aparine* 1.

Smooth perennial; stems merely slightly bristly; leaves rigid-pointed and fragrant in drying............ *G. triflorum* 10.

1. **G. Aparine** L. (*Goose Grass.*) Stems weakly reclining; joints hairy; leaves rough on margin and midrib, about 8 to a whorl, lanceolate; peduncle 1-3-flowered; fruit 3-4 mm. in diameter.—Wet grassland along the Grand Calumet and low dune woods. Summer.

2. **G. pilosum** Ait. Leaves hairy, oval, dotted; peduncles 2-3-forked.—Common in oak woods throughout. Summer.

3. **G. circaezans** Michx. (*Wild Licorice.*) 3 dm. tall; leaves ciliate, oval or ovate-oblong; peduncles once-forked, long, bearing several hairy inconspicuous flowers on long pedicels; peduncles divergent and pedicels reflexed in fruit.—Shady hollows among the dunes, frequent. Summer.

4. **G. boreale** L. 3-10 dm. tall, smooth; leaves linear-lanceolate, in whorls of 4; fruit minutely bristly or smooth.—In oak woods, occasional, especially on old beach ridges.

5. **G. trifidum** L. Branching, weak, slender, densely matted; leaves linear-spatulate, in whorls of 3 or 4; flowers solitary or 3 together on very slender pedicels; corolla only 0.5 mm. long.—Moist or mossy shores of the Grand Calumet. Summer.

6. **G. Claytoni** Michx. Similar but stouter; leaves in whorls of 4 or 6; flowers in terminal clusters, 2-3 together; pedicels stout.—Ditches, Roby, to Furnessville; marshes at Tamarack Sta. Summer.

7. **G. tinctorium** L. Stem stiffly erect, 1.5-2 dm. tall, branched at base; leaves linear, slightly rough on midrib and margin, in whorls of 4, dull green; flowers in terminal clusters of 2-3; fruit 2.5-3.5 mm. thick.—Sandy soil of the Post-Tolleston beaches. Summer.

8. **G. labradoricum** Wiegand. 0.5-3 dm. tall, smooth; leaves soon reflexed, small, rough beneath on margin and nerve; flowers and fruit as in the preceding but smaller; rootstocks filiform.—In the tamarack bog at Mineral Springs, apparently the only station.

9. **G. concinnum** T. & G. Stems 1.5-3 dm. tall, slender, the angles minutely prickly; leaves veinless, linear, in whorls of 6; peduncles diffusely panicled.—Dry woods near Clarke and low dune woods, Tremont and Keiser.

10. **G. triflorum** Michx. (*Fragrant Bedstraw.*) 3-10 dm. long; leaves elliptical-lanceolate; peduncles bearing 3 greenish flowers.—Dry woods, Clarke, according to Gates, and probably elsewhere.

Diodia teres Walt. is reported by Umbach (acc. to Pepoon) as common on dry sandy soil west of Dune Park. There are no specimens in Umbach's or any other herbarium to support this dubious report.

HONEYSUCKLE FAMILY (Loniceraceae)

Shrubs or rarely trees or herbs, with opposite leaves and stamens as many as or 1 fewer than the lobes of the tubular or rotate corolla, inserted on its tube; calyx tube adherent to the 2-5-celled ovary; fruit a pod, drupe or berry.

Herbs.	
Creeping, with long-pedunculate twin flowers; stamens 4; fruit dry	*Linnaea* 6.
Erect; flowers sessile with corolla protuberant; stamens 5; fruit a drupe	*Triosteum* 5.
Shrubs, trees, or woody vines.	
Corolla tubular, often irregular or 2-lipped.	
Calyx teeth long and slender	*Diervilla* 4.
Calyx teeth very short	*Lonicera* 3.
Corolla wheel-shaped or urn-shaped, regular, deeply 5-lobed.	
Leaves simple; fruit a 1-celled 1-seeded drupe	*Viburnum* 2.
Leaves pinnate; fruit berry-like, containing 3 small seed-like nutlets	*Sambucus* 1.

1. SAMBUCUS L. Elder

Soft-woody shrubs with a rank odor when bruised, and serrate-pointed leaflets; flowers numerous, small, in compound cymes; calyx lobes obsolete or minute; corolla open urn-shaped; stamens 5; stigmas 3; fruit juicy.

Stems practically herbaceous, with white pith; leaflets smoothish; cymes flat; fruit purple-black	*S. canadensis* 1.
Stems woody, pith brown; leaflets downy beneath; panicled cymes convex; fruit bright red or rarely white	*S. racemosa* 2.

1. **S. canadensis** L. (*Common Elder.*) Shrub 1-4 m. high; leaflets 5-11, the lower often 3-parted, mostly smooth; flowers pure white, odorous.—A common shrub of swales, river banks and swamps throughout our area. The berries are made into wine. June, July.

2. **S. racemosa** L. (*Red-berried Elder.*) Shrub 1-4 m. tall; bark warty; leaflets 5-7, downy beneath; flowers yellowish white, sometimes tinged with crimson, turning brown in drying. (*S. pubescens* Pers., *S. pubens* Michx.)—In tamarack bogs at Mineral Springs, Keiser and Tamarack Sta. A northern plant. Flowers, May; fruit, June.

2. VIBURNUM L. Arrow-wood

Flowers in flat compound cymes; leaf buds naked or with a pair of scales; stigmas 1-3; drupe with a soft pulp and a thin-crustaceous flattened or tumid stone. Shrubs or, rarely, of the stature of small trees.

Leaves palmately veined and 3-lobed.	
Marginal flowers of the cymes neutral, with greatly enlarged flat corollas; stone not grooved	*V. trilobum* 1.
Marginal flowers of the cymes fertile, not differing from the others; stone grooved	*V. acerifolium* 2.
Leaves pinnately veined, not 3-lobed.	
Leaves coarsely toothed, with straight veins; stone grooved.	*V. affine* 3.
Leaves finely toothed, veins curved and joining near edge of leaf; stone flat, not grooved.	
Petioles distinctly winged leaves subtending the inflorescence mostly caudate-acuminate	*V. Lentago* 4.
Petioles wingless; leaves bluntish or merely acute	*V. prunifolium* 5.

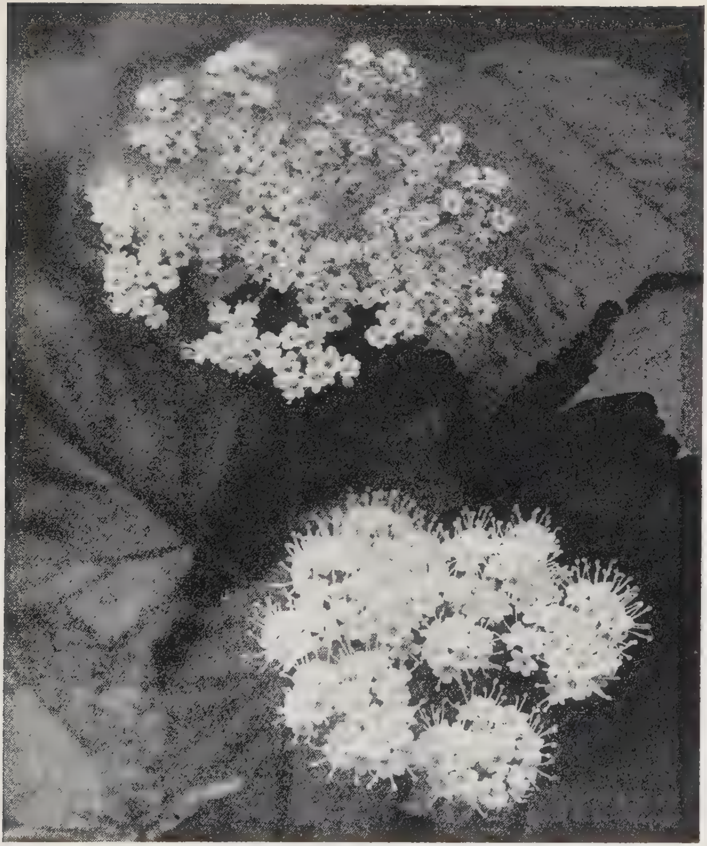


FIG. 35. HIGH-BUSH CRANBERRY (*Viburnum trilobum*)

1. **V. trilobum** Marsh. (*High-bush Cranberry.*) Shrub 1-4 m. tall, nearly smooth throughout; leaves broadly wedge-shaped or the base truncate, the pointed lobes spreading, toothed all around except in the entire sinuses; cyme broad; stamens elongate; fruit bright red, globose. (*V. edulum* Raf., *V. Oxycoccus* Pursh, *V. americanum* of auths., not Mill. *V. Opulus* vars., of auths.)—In cool woods or thickets, infrequent from Pine eastward among the high dunes. The acid fruit is edible. The much-cultivated snow-ball bush is *V. Opulus* var. *sterile* DC. of the Old World.

2. **V. acerifolium** L. (*Dockmackie.*) Shrub 1-1.5 m. tall; leaves soft-downy beneath, maple-like; cymes small; stamens exserted; fruit flattened, at first scarlet, then blue-black, inedible.—A common shrub of the oak and maple woods throughout. May, June. Flowers rather fetid; autumn foliage bright scarlet.

3. **V. affine** Bush. Shrub 1-2 m. tall, with slender upright branches; petioles long (up to 5 cm.); leaves stipulate, ovate to ovate-lanceolate, acute or acuminate, pubescent; cymes dense; fruit oval, about 1 cm. long, slightly flattened, nearly black. (*V. pubescens* of auths., not Pursh; *V. pubescens* var. *petiolum* Fitzpatrick.)—Probably somewhat widely distributed in our area, in low thickets. Known stations are: Long Lake, Michigan City, Miller, Waverly Beach. Flowers, May, June. Fruit, August, September.

Var. **hypomalacum** Blake. Similar but the petioles very short; stipules conspicuous; leaves nearly velvety beneath. (*V. pubescens* of auths., not Pursh.)—Specimens are from Michigan City only, but it is probably more widely diffused.

Viburnum dentatum L. has often been reported, frequently on high authority, but older treatments of the genus confused the species. Reports of *Viburnum dentatum* and *Viburnum pubescens* may largely be assigned to the foregoing species.

4. **V. Lentago** L. (*Nannyberry, Wild Raisin.*) Tree or shrub with ovate, closely and sharply serrate leaves; cymes sessile, 6-10 cm. long, 3-4-rayed; drupe 1-1.5 cm. long, ovoid or ellipsoid, blue-black, sweet.—Rare, woods and thickets, Pine to Tamarack Sta. May, June.

5. **V. prunifolium** L. (*Black Haw.*) Small tree or shrub; leaves oval, finely serrate, 2-7 cm. long; cyme 3-5-rayed; fruit similar to that of the preceding species.—Open ground of the Calumet District, near the Lake Shore. May, June.

3. LONICERA L. Honeysuckle.

Shrubs or woody vines, with entire leaves and fragrant showy flowers; calyx teeth very short; corolla tubular, often lobed or saccate at the base, irregular and 2-lipped or almost regularly 5-lobed; berry several-seeded.

Upright shrub with distinct leaves; flowers in pairs on axillary peduncles; calyx teeth not persistent..............	*L. canadensis* 1.
Twining vine-like shrub; the upper leaves united at base; flowers in sessile whorled clusters in the axils of the upper leaves, forming interrupted spikes; calyx teeth persistent on the berry..........................	*L. dioica* 2.

1. **L. canadensis** Marsh. (*American Fly Honeysuckle.*) 1-1.5 m. tall, with straggling branches; leaves on short petioles, entire, glabrous, thin, cordate-oval; corolla white or roseate with almost equal lobes, these widely spreading and nearly as long as the tube; berries orange or red, united at base. (*Xylosteon ciliatum* Pursh.)—This is reported from Pine by Bastin. Just across our western borders (Pepoon). April-June.

2. **L. dioica** L. 1-3 m. long, glabrous; leaves glaucous beneath, the upper 4 pairs connate at base, forming somewhat rhombic, pointed disks; corolla purplish or greenish yellow, the tube barely 1 cm. in length and hirsute inside; lower lip of the corolla narrow, the upper 4-lobed and broad; the hairy styles and stamens conspicuously exserted; berry red or orange.—Abundant on dunes and banks of streams and tamarack bogs from Pine along the Grand Calumet and eastward to Mineral Springs. May, June.

Dr. H. H. Babcock long ago reported "*L. parviflora* Lam. var. *Douglasii* Gray, rare at Pine and Miller." This is synonymous with *L. glaucescens* Rydb., but Dr. Babcock probably confused his plant and it is likely that he had in hand *L. dioica.*

4. DIERVILLA Mill. Bush Honeysuckle

Low upright shrubs with axillary or terminal cymose flowers; calyx lobes slender, persistent; corolla 5-lobed, practically regular; fruit a slender pod.

1. **D. Lonicera** Mill. Leaves petioled, oblong-ovate, serrate, taper-pointed; peduncles 3-flowered; flowers pale yellow, turning sulphur yellow, scarlet, or very dark red; pod long-beaked. (*D. Diervilla* MacM.; *D. Lonicera* L., *D. canadensis* Willd.)—Frequent in open sandy woods of the Post-Tolleston beaches and Miller. Rare on the high dunes. June-August.

5. TRIOSTEUM L. Feverwort

Coarse hairy perennials with large leaves meeting at base around the simple stem; calyx lobes leaf-like and narrow; corolla nearly regularly 5-lobed and tubular, scarcely longer than the calyx; ovary ripening into a 3-ribbed dry drupe containing bony nutlets.

1. **T. perfoliatum** L. (*Wild Coffee, Tinker's Weed.*) 0.5-1.5 m. tall, the stem glandular-puberulent near the top; leaves thick, oval, dark green; corolla bell-shaped, barely 2-lipped, greenish or yellowish or ruddy-purple; fruits orange, 6-8 at each node.—Reported from Whiting and Miller (H. & R.) in rich woods. May, June.

6. LINNAEA [Gronov.] L. Twin-flower

Slender, creeping evergreen with small leaves and forking peduncles, the pedicels forked at the top, each fork bearing a delicate nodding flower; corolla almost equally 5-lobed, slenderly bell-shaped; stamens 4, 2 of them shorter; fruit a small, dry, 3-celled but 1-seeded pod.

1. **L. borealis** L. var. **americana** (Forbes) Rehder. Stem slightly hairy; leaves contracted at base into short petioles, oval, sparingly crenate; peduncles and pedicels hair-thin; corolla white tinged with rose-purple stripes, inwardly hairy.—A beautiful little plant found

around the edges of tamarack bogs, in Nyssa woods. June-August. (Dedicated to Linnaeus, father of botany, with whom the European type of this plant was the favorite flower.)

GOURD FAMILY (Cucurbitaceae)

Coarse, chiefly twining or trailing herbs with tendrils; leaves alternate and palmately lobed; the sexes in different flowers or on different plants; limb of the calyx and corolla usually more or less combined and 5-6-lobed or parted, the corolla sometimes of nearly or quite separate petals or else united; stamens 3-8, some anthers 1-celled, some 2-celled, more or less united either by their anthers or their filaments or both; stigmas 2 or 3; ovary 1-3-celled, adherent with the calyx-tube; fruit in our species of the type of squash, pumpkins, gourd; seeds large, usually flat.

Flowers large, yellow, the corolla bell-shaped, 5-lobed; fruit smooth.. *Cucurbita* 1.

Flowers small, white, flat and spreading, deeply 6-parted; fruit prickly.................................... *Echinocystis* 2.

1. CUCURBITA L. Gourd. Squash. Pumpkin

Annuals or with perennial roots and large, cordate, angulate or lobed leaves, with large solitary flowers in the axils, the sexes on separate plants; tips of the corolla recurved; anthers united but filaments free; style short; fruit covered with a firm rind, fleshy within.

Leaves deeply 3-5-lobed................................ *C. Pepo* var. *ovifera* 1.

Leaves merely angulate or slightly 3-5-lobed............... *C. foetidissima* 2.

1. **C. Pepo** L. var. **ovifera** (L.) Bailey. (*Pear Gourd.*) Annual with long-running, prickly-hispid stems and very rough, dark, dull-green leaves on hispid petioles; corolla yellowish or orange, the lobes pointed, erect; peduncle very hard and deeply furrowed, not enlarging in fruit; fruit small, hard, pear-shaped, egg-shaped, or globular, often stiped, inedible.—Intr. from Am. tropics and escaped cult., nat. on pure sand around Tremont. Summer.

2. **C. foetidissima** HBK. (*Missouri Gourd.*) Perennial from thick carrot-like roots, rooting at the nodes, stout, hirsute, trailing long distances; leaves thick, fleshy, rough above, whitish-canescent beneath; flowers large, pale; fruit globose or ovoid, smooth, its pulp fibrous and bitter.—Plant of the Great Plains, sprawling on railroad tracks in the Calumet District, as a naturalized waif.

2. ECHINOCYSTIS T. & G. Wild Cucumber

Tall climbing annual, nearly smooth, bearing tendrils which are 3-forked; male flowers in compound racemes, female in small clusters or solitary, from the same axils with the male; petals united at base into an open spreading corolla; anthers more or less united; ovary

2-celled; stigma broad; fruit fleshy, becoming ultimately dryish, finally bursting at the summit and emitting the large flat hard seeds with roughened coats.

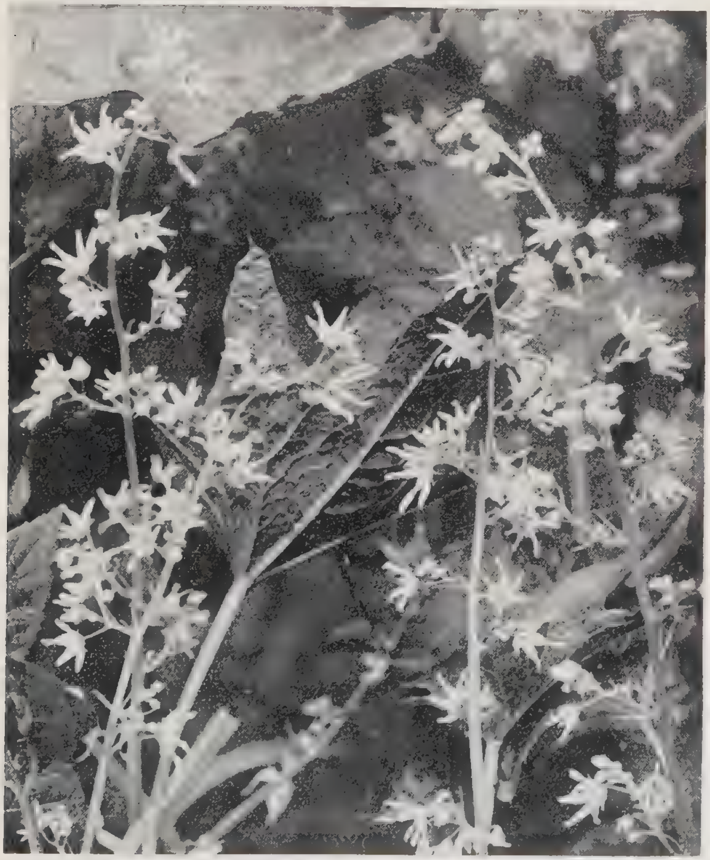


FIG. 36. WILD CUCUMBER (*Echinocystis lobata*)

1. **E. lobata** (Michx.) T. & G. Leaves deeply and sharply 5-lobed; petals lanceolate; fruit 5 cm. long, ovoid, the prickles weak; seeds dark. (*Sicyos* Michx., *Micrampelis* Greene; *M. echinata* Raf., *Momordica echinata* Muhl., *Hexameria echinata* T. & G.)—In bush thickets near Miller and Wolf Lake. July-October. Flowers fragrant at night.

BLUEBELL FAMILY (Campanulaceae)

Herbs with somewhat milky juice; leaves alternate; calyx and corolla 5-lobed and regular, mostly bell-shaped, sometimes wheel-shaped; stamens 5, mostly free from the corolla; ovary adherent to the calyx; style 1, beset with hairs; stigmas 2 or more; fruit a many-seeded capsule.

Corolla usually bell-shaped; capsule obconic to globose. . . . . . *Campanula* 1.
Corolla wheel-shaped; capsule slender-cylindric. . . . . *Specularia* 2.

1. CAMPANULA L. Bluebell

Flowers terminal or axillary; stamens 5 with filaments thin and broad at base; capsule globose to obconic.

Flowers numerous, in long racemes, the corolla wheel-shaped. *C. americana* 1.
Flowers one to several in loose inflorescences; corolla bell-shaped.
  Stems backwardly scabrous on the angles as are also the margins and midnerves of the leaves.
    Flowers 5-8 mm. long, on spreading leafy branches. . . . . *C. aparinoides* 2.
    Flowers 10-12 mm. long, on ascending naked peduncles. *C. uliginosa* 3.
  Stems and leaves never scabrous, rarely even villous. . . . . . *C. rotundifolia* 4.

1. **C. americana** L. Annual with slender simple stem 0.5-2 m. tall, with serrate, tapering, ovate or ovate-lanceolate leaves on margined petioles; raceme long, densely flowered, the flowers 2.5 cm. broad, bright blue; capsule opening by pores at the summit.—Rare, in dune meadows. June-August.

2. **C. aparinoides** Pursh. Stem 2-6 dm. long, weak, erect or reclining, simple or branched, somewhat 3-angled; leaves lanceolate or linear-lanceolate, soft; lobes of the calyx half as long as the length of the nearly white corolla.— Frequent in bogs and in wet grassy lands, having the habit of a *Galium*. June-August.

3. **C. uliginosa** Rydb. Similar, but stiffer, the flowers bluish.—A species rather poorly defined from the preceding and perhaps only a variety of it. Found in the same situations.

4. **C. rotundifolia** L. (*Harebell, Scotch Bluebell.*) Stems simple or branched, erect, 1-5 dm. tall, the basal leaves (these often absent at flowering time) round-heart-shaped to ovate or broadly lanceolate, entire or toothed; sometimes leaves of the same type occurring on the stem, but most of the stem leaves linear or narrowly lanceolate, entire or slightly dentate; capsule opening by pores at the base.—This, the true species, with stems densely puberulent at the base, is found in Europe and western America but in our area is represented by:

Var. **intercedens** (Witasek) Farwell. Stems glabrous or pubescent only in lines; flowers several or numerous, blue, purplish, or rarely white, 1.5-2.5 cm. long.—Common in sandy fields, wooded dunes and even in tamarack bogs. June-October.

Var. **arctica** Lange. Resembling the preceding but dwarfed, rigid, 1-few-flowered, the leaves shorter and firmer. (*C. dubia* A. DC.; *C. Langsdorfiana* Britton.)

2. SPECULARIA Fabricius. Venus's Looking Glass

Low slender annuals with purplish axillary flowers in our species; filaments hairy, shorter than the anthers.

1. **S. perfoliata** (L.) DC. 1-10 dm. tall, hairy; leaves clasping, roundish, toothed; flowers sessile, 1-3 in the axils, only the upper having conspicuous expanding corollas; capsule short. (*Legouzia* Britton.)—In sandy fields in the northern part of Lake Co. Early summer.

LOBELIA FAMILY (Lobeliaceae)

Herbs with bitter milky juice, alternate leaves and more or less irregular, 2-lipped flowers, the corolla 5-lobed, not adherent to the stamens which are united by their anthers and often by their filaments into a tube; ovary and many-seeded pod adherent to the calyx tube; style 1. Probably all more or less poisonous.

1. LOBELIA L. Lobelia

Flowers axillary or in leafy bracted racemes; calyx with short tube and 5 lobes; corolla with straight tube split down the upper side; two of the anthers bearded at the top; pod opening at the top, 2-celled.

Flowers 1.5-2.5 cm. long.	
Pedicels much shorter than the leaf-like bracts	*L. cardinalis* 6.
Pedicels much longer than the leaf-like bracts	*L. siphilitica* 5.
Flowers, at least the corolla tube, not more than 8 mm. long.	
Stem paniculately branched.	
Corolla (full length) 1 cm. long	*L. Kalmii* 2.
Corolla 3-4 mm. long	*L. inflata* 1.
Stem simple.	
Sinuses of calyx lobes with 10 slender appendages	*L. leptostachys* 4.
Sinuses of calyx unappendaged	*L. spicata* 3.

1. **L. inflata** L. (*Indian Tobacco.*) Annual, with spreading hairs, 3-8 dm. tall; leaves ovate, diminishing above into leaf-like bracts; flowers pale lilac or whitish; pod inflated.—A very poisonous plant, weedy, in dry sandy fields throughout. Summer.

2. **L. Kalmii** L. 1-5 dm. tall, angled, slender; leaves linear; pedicels very slender, not as long as the threadform bracts; corolla pale blue; calyx-lobes covering the pod.—Wet limy shores and bogs, Wolf Lake, Clarke, and tamarack woods, Mineral Springs. Summer.

3. **L. spicata** Lam. Slender, strict, up to 1 m. tall; leaves lanceolate to obovate, the upper reduced to narrow, club-shaped bracts; flowers light bright blue, in a long slender raceme.—Meadows and swamps of the Calumet District, and oak ridges. Early summer.

4. **L. leptostachys** A. DC. Leaves thick, obtuse, oblong-lanceolate, reduced above to awl-shaped bracts; corolla scarcely longer than the calyx, light blue; flowers in a long slender raceme.—In sandy soil of the Post-Tolleston beaches.

5. **L. siphilitica** L. (*Blue Lobelia.*) Tall, stout perennial, somewhat hairy, very leafy; leaves thin, acute, irregularly serrate; flowers deep brilliant blue.—Common in swampy fields and ditches throughout. August-September. Forma *albiflora* (Britton) House. Flowers white. Occasional with the species.

6. **L. cardinalis** L. (*Cardinal Flower.*) Tall smoothish perennial with slightly toothed, oblong-lanceolate leaves and 1-sided, long racemes; corolla brilliant red.—In wet fields, occasional throughout. Summer. Forma *alba* (A. A. Eaton) St. John. Flowers white. Rare.

THISTLE FAMILY (Compositae)

Flowers united in a head, enclosed in a common (often calyx-like) cup or involucre composed of more or less numerous bracts, scales or leaf-like structures; the flowers seated on a smooth or variously chaffy or bristly receptacle. The heads consist of one or more, frequently many, small florets with regular or irregular corollas. Stamens five, inserted on the corolla; anthers united into a tube. Ovary inferior, one-celled, with an entire or 2-cleft stigma; calyx reduced to a series of hairs, bristles, scales, or teeth called *pappus* (as the "down" of thistles) or wholly wanting; when present it surmounts the dry 1-seeded, seed-like fruit (achene).

The largest of all flowering plant families, in our area consisting entirely of herbs, and falling into three general classes of structure. In one of these, the *Liguliflorae*, all the florets are irregular, one limb of the corolla being long-extended or strap-shaped (ligulate), and of such florets the whole head is composed, as in a dandelion. In another class only the marginal florets are ligulate, when they are called the *rays* (often petal-like in appearance), while the florets in the center are regular, tubular, not ligulate, and much less conspicuous and are called collectively the *disk* (or "eye," as in the daisy). In still another class, as in Joe Pye weed, ironweed, or cudweed, there are only regular, disk florets, the rays being entirely lacking. The last two classes make up the series *Tubiflorae*. The family has sometimes been split up into several families, bearing such names as Cichoriaceae, Asteraceae, Carduaceae, Ambrosiaceae.

Flowers with regular tubular corollas or only the marginal ones irregular with a strap-shaped limb; flowers perfect or with the sexes in different flowers, different heads, or even on different plants; milky juice none. (*Tubiflorae.*)
- Heads without marginal ray florets.
  - Leaves, at least the lower ones, opposite or whorled.
    - Heads very small, in narrow spikes.
      - Leaves 3-lobed; involucre of the female flowers bur-like.................................... ***Ambrosia*** **15.**
      - Leaves only obscurely or not at all lobed; involucre of a few rounded bracts.................. ***Iva*** **14.**
    - Heads medium or large.
      - Flowers yellow; fruit crowned with 2-3 barb-like teeth or awns, flattish, slenderly 4-angled.
        - Leaves simple or pinnate, not capillary-dissected. ***Bidens*** **23.**

Leaves many times divided, divisions capillary... *Megalodonta* 24.

Flowers white or purple; fruit 3-angled, not crowned with awns.............................. *Eupatorium* 2.

Leaves alternate.

Leaves with spiny teeth and bristly bracts; pappus plumose (thistles)................................ *Cirsium* 36.

Leaves unarmed; bracts unarmed (except in *Arctium*); pappus none or if present not plumose (except in *Liatris* and *Kuhnia* and minutely so in *Vernonia*).

Flowers white.

Heads small, numerous, paniculate............. *Erigeron* 8.

Heads medium or large, not very numerous, corymbose or corymbose-paniculate.

Pappus very plumose; plants resinous-dotted.. *Kuhnia* 3.

Pappus not plumose; plants not resinous-dotted.

Receptacle flat or low-convex; low woolly plants with pappus a single row of bristly hairs.

Plants usually branched; stems leafy; flowers in dense heads containing both sexes on one plant; pappus not united in a ring at the base........ *Gnaphalium* 10.

Plants mostly unbranched (except the inflorescence); leaves mainly basal, those of the stem reduced; flowers mostly in loose clusters, sexes on different plants, the male smaller; pappus united in a ring at the base. *Antennaria* 9.

Receptacle conical; taller plants which are hairy, rough, or completely smooth, but not woolly; pappus none, or of soft white hairs.

Pappus none; heads small; leaves rough; 5 minute ray florets present but obscure .... *Parthenium* 13.

Pappus of soft white hairs; heads larger; leaves not rough.

Hairy annual; flowers corymbose-paniculate........................ *Erechtites* 32.

Smooth perennials; flowers in flat corymbs....................... *Cacalia* 33.

Flowers not white.

Flowers purple or blue.

Pappus plumose (at least minutely so); plants from a corm or tuberous base......... *Liatris* 4.

Pappus none or if present not plumose; plants not from a corm or tuber.

Involucral bracts bristly-hooked; heads small; leaves cottony-tomentose beneath........................... *Arctium* 35.

Involucral bracts not bristly-hooked; heads much larger; leaves not woolly-tomentose beneath.

Pappus none or if present only partly of long soft bristles.

Pappus none or partly bristly but never of long copious hairs; heads single, the enlarged sterile marginal flowers appearing (falsely) radiate...................... *Centaurea* 37.

Pappus double, the outer of minute scale-like bristles, the inner of long copious soft hairs; heads corymbose; marginal flowers not enlarged.... *Vernonia* 1.

Pappus wholly of long soft bristles....... *Aster* 7.

Flowers yellow or greenish-yellow.

Leaves toothed or entire, but not deeply lobed; fruit a bur......................... *Xanthium* 16.

Leaves deeply trilobate, pinnatifid or several-times pinnate; fruit not a bur.

Heads corymbose, moderately large, erect... *Tanacetum* 30.

Heads paniculate or in long narrow spikes, small.

Heads mostly nodding, both sexes in the same head; strong-scented plants... *Artemisia* 31.

Heads mostly erect, the male flowers in the heads of the upper parts of the spikes, the female in the lower; plants not aromatic.............. *Ambrosia* 15.

Marginal ray florets present.

Rays yellow.

Pappus of numerous capillary hairs; rays erect, entire.

Heads large, 3-5 cm. in diam.; rays numerous, long; tall, stout, roughish plants........... *Inula* 11.

Heads much less than 3 cm. in diam.; rays 1-16, shorter; plants not very tall or stout.

Bracts in several rows; stem leaves not very deeply incised; heads racemose or paniculate, never solitary, rarely corymbose......... *Solidago* 5.

Bracts all in 1 row; stem leaves lyrate to deeply cut; heads solitary or corymbose......... *Senecio* 34.

Pappus not of numerous capillary hairs.

Pappus of 5-8 thin chaffy scales, the nerves extending into a bristle or point; rays reflexed, 3-cleft at the apex............................... *Helenium* 26.

Pappus none or of 2 or 3 awn-like teeth upon the summit of the achene, or if of thin chaffy scales, the nerve not extended into a bristle point.

Receptacle flat or low-convex.

Ray flowers in 2 or 3 series; achenes wing-margined; plants resinous................ *Silphium* 12.

Ray flowers in one row; achenes not wing-margined; plants not resinous.

Achenes not compressed; scales of the receptacle concave or clasping........... *Helianthus* 21.

Achenes much flattened; scales not concave or clasping.

Pappus none or of barbless awns......... *Coreopsis* 22.

Pappus consisting of barbed awns surmounting the fruit..................... *Bidens* 23.

Receptacle conical.

Leaves opposite; ray flowers pistillate......... *Heliopsis* 17.

Leaves alternate; ray flowers neuter or staminate.

Receptacle chaffy; odorless herbs with large heads and rays.

Chaff of the receptacle thickened and bearded at the tips; achenes winged; rays reflexed. .... *Lepachys* 20.

Chaff of the receptacle not bearded; achenes not winged; rays not reflexed...... *Rudbeckia* 18.

Receptacle naked; strong-scented plants with small heads and sometimes a few small obscure ray florets................. *Tanacetum* 30.

Rays not yellow.

Pappus of soft hairs.

Involucral bracts mostly equal, chiefly in one series. *Erigeron* 8.

Involucral bracts in several series, the series unequal in length................................. *Aster* 7.

Pappus not of soft hairs.

Pappus a circle of thin chaffy scales.

Rays small, white; inconspicuous low weed ..... *Galinsoga* 25.

Rays showy, brown-purple; tall native plant .... *Helenium* 26.

Pappus none, or a scaly cup or rarely of chaffy scales; heads mostly many-flowered with variously colored rays.

Receptacle smooth; rays white or barely purplish.

Leaves entire; achene winged, armed with a pappus of several minute bristles and 2 or 3 longer awns. .... *Boltonia* 6.

Leaves cut-lobed; achene not winged; no pappus or awns present ("daisy")............ *Chrysanthemum* 29.

Receptacle chaffy or bristly.

Rays rose-color, blue, purple, or red.

True rays present, drooping............... *Brauneria* 19.

Enlarged marginal flowers appearing falsely radiate, erect..................... *Centaurea* 37.

Rays white, rarely pinkish; strong-scented plants.

Rays 5, very small, erect, scarcely exceeding the disk; leaves not deeply cleft...... *Parthenium* 13.

Rays 5 or usually more, exceeding the disk, divergent; leaves deeply cleft or much divided.

Heads less than 1 cm. broad; achene compressed........................ *Achillea* 27.

Heads more than 1 cm. broad; achenes not compressed..................... *Anthemis* 28.

All the florets ligulate, containing both sexes; leaves always alternate or basal; plants with more or less milky juice. (*Liguliflorae.*)

Pappus composed at least in part of scales.

Flowers yellow; leaves wholly basal; pappus partly of hairs.................................... *Krigia* 40.

Flowers blue (rarely pink or white); with reduced stem leaves; pappus wholly chaffy................. *Cichorium* 39.

Pappus composed entirely of soft hairs.

Pappus plumose................................ *Tragopogon* 38.

Pappus not plumose.

Plants with leaves wholly basal................... *Taraxacum* 41.

Plants with leaves on the stem.

Achenes flat.

Achenes beaked............................ *Lactuca* 43.

Achenes not beaked.......................... *Sonchus* 42.
Achenes columnar or roundish.
Flowers cream or white; heads nodding......... *Prenanthes* 44.
Flowers yellow or orange; heads erect........... *Hieracium* 45.

1. VERNONIA Schreb. Ironweed

Perennial herbs with alternate, sessile or nearly sessile leaves and corymbs of handsome purple or rarely white flowers; corollas all tubular; heads many-flowered; involucre hemispheric; bracts in many rows; pappus in 2 series, the outer of short stout scales or bristles, the inner of numerous long, roughened, capillary bristles; achenes cylindrical, ribbed.

Leaves smooth or merely puberulent below.
Cymes dense....................................... *V. fasciculata* 1.
Cymes open.. *V. altissima* 2.
Leaves tomentulose below.............................. *V. missurica* 3.

1. **V. fasciculata** Michx. Tall, with narrow ascending leaves; heads small, 20-flowered, in a crowded clustered cyme; flowers reddish purple; involucral bracts purple-tinged.—A handsome species, dune woods, roadsides, prairies, throughout, frequent. July, August.

2. **V. altissima** Nutt. Similar to the preceding; heads 25-flowered.—Dune Park, acc. to Pepoon, Tremont, acc. to Churchill.

3. **V. missurica** Raf. Tall and stout; leaves large, oblong-lanceolate, acuminate, slightly scabrous beneath; heads 35-50-flowered, in a dense cyme; flowers purple; involucral bracts green. (*V. altissima* var. *grandifolia* Gray; *V. Drummondii* Shuttlw.)—On prairies of the Calumet District. July, August.

2. EUPATORIUM L. Thoroughwort

Our species tall coarse herbs with opposite, whorled, or perfoliate leaves and white, purple or mauve flowers in corymbs or corymbose panicles; corollas all tubular; heads few- to many-flowered; involucres mostly long-cylindric or rarely bell-shaped, composed of numerous bracts in several rows; pappus in one series, composed of copious soft hairs; achenes 5-angled or truncate.

Flowers rose-color, mauve or flesh color; leaves whorled..... *E. purpureum* 1.
Flowers white; leaves not whorled.
Leaves perfoliate....................................... *E. perfoliatum* 2.
Leaves sessile .... *E. sessilifolium* 3.
Leaves mostly petioled, 3-nerved.
Leaves all opposite.................................. *E. urticaefolium* 5.
Upper leaves alternate.............................. *E. serotinum* 4.

1. **E. purpureum** L. (*Joe Pye Weed.*) Stout, up to 3 m. tall, simple-stemmed; leaves 3-6 in a whorl, oblong-ovate, coarsely toothed, acuminate, bronze-green, thick and veiny; cymose panicles flattish-topped, crowded; flowers rose-purple to flesh color. (*E. purpureum* L.

as to description; *E. purpureum* var. *maculatum* Darl. [as in Gray's Man.]; *E. maculatum* Wood, not *E. maculatum* L.)—Common in sandy fields, by roadsides and in woods. A handsome species. August-October.

2. **E. perfoliatum** L. (*Boneset.*) Stem stout, up to 1.5 m. tall, hairy; leaves long, lanceolate, united around the stem by clasping bases, tapering, serrate, wrinkled, veiny, light green, whitish-downy beneath; heads in large compound corymbs, 10-40-flowered, grayish or silvery white.—Common in sandy fields, by roadsides, and in woods, and even in shallow water. August-October.

3. **E. sessilifolium** L. (*Upland Boneset.*) 0.5-2 m. tall, branching, smooth; leaves tapering from near the rounded base of the oblong blade to a sharp point, veiny, serrate; corymb pubescent, compound; bracts of the 5-flowered involucre oval, obtuse.—Open wooded dunes, occasional. Summer and autumn.

4. **E. serotinum** Michx. Stems bushy-branched, 1-2 m. tall, thickly pubescent; leaves veiny, coarsely serrate, ovate-lanceolate; heads 12-15-flowered in compound corymbs; involucre very pubescent. —Dry or low ground, Clarke to Miller. Summer.

5. **E. urticaefolium** Reichard. (*White Snakeroot.*) Smooth, slender; leaves broadly ovate, thin, not wrinkled or veiny, coarsely toothed, cordate; heads 8-30-flowered in compound corymbs; flowers creamy white. (*E. ageratoides* L.; *Ageratina ageratoides* Spach.)—Occasional in rich woods along creeks in the dunes. August-October. When eaten by cows it poisons the milk, causing milk sickness, similar to lead poisoning and often fatal to human beings.

3. KUHNIA L.

Our species resinous-dotted plants with alternate leaves and creamy-white flowers in paniculate-corymbose heads; flowers all tubular; heads 10-15-flowered; involucre narrow, of a few loosely overlapping bracts; pappus a single row of soft, very plumose bristles.

1. **K. eupatorioides** L. Stem minutely pubescent, branched from the base, 3-9 dm. tall; leaves broadly lanceolate and toothed, or linear and entire; flowers creamy white; pappus conspicuous after flowering. —Forming clumps; a characteristic plant of open or wooded dunes; also found sometimes in the Calumet District. August, September.

4. LIATRIS Schreb. Sky Rockets. Blazing Star. Button Snakeroot

Showy plants with corms or tubers at the base, the leaves entire, the heads of purple flowers in racemes; flowers all tubular; heads few- to many-flowered; pappus of few to many soft white bristles, these plainly plumose or minutely barbellate; involucre oblong, ovoid, or hemispheric, its bracts overlapping in several series; achenes 10-ribbed.

Pappus very plumose; heads many-flowered.
  Bracts with leafy, spreading, elongated tips.............. *L. squarrosa* 1.
  Bracts with short, round, appressed and abruptly mucronate tips.. *L. cylindracea* 2.
Pappus not plumose to the naked eye.
  Heads 25-40-flowered................................ *L. scariosa* 3.
  Heads 8-15-flowered................................. *L. spicata* 4.

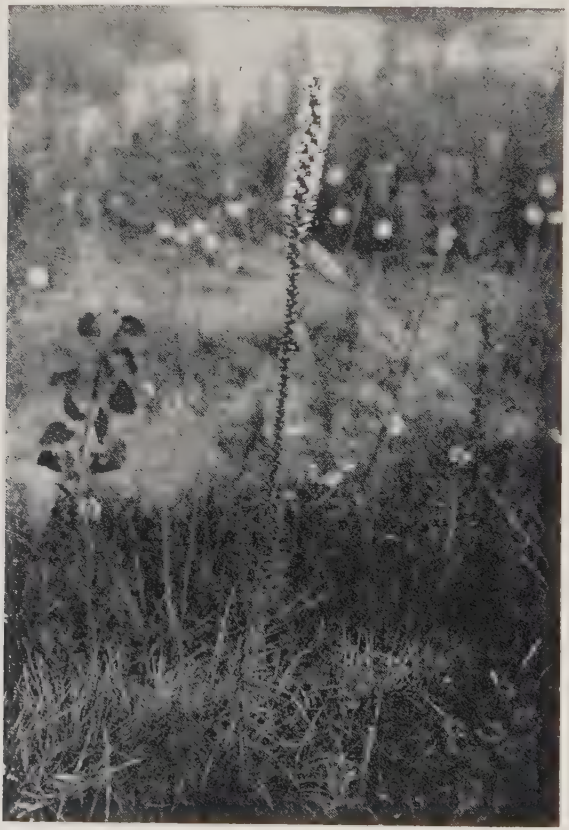


FIG. 37. BLAZING STAR (*Liatris spicata*)

1. L. squarrosa Willd. 5-7 dm. tall; leaves long and rigid and very slender; heads few, 1.5-3.5 cm. long. (*Lacinaria* Hill.)—Rare in dry soils from Pine to Dune Park. Summer.

2. **L. cylindracea** Michx. Smooth, 1.5-5 dm. tall; leaves linear, numerous; spike bearing few heads or only one, these 1.5-2.5 cm. long; bracts of the involucre imbricated in several rows, with rigid, mucronate tips. (*Lacinaria* Kuntze.)—Common in oak woods and dunes, throughout; a beautiful species. August, September.

3. **L. scariosa** Willd. Stem up to 2 m. tall, stout, hoary or pubescent; leaves smooth or rough, lanceolate, the lower broader, petioled; heads few or many, large, in loose racemes; involucre broad, depressed; bracts spatulate, dry and papery with purple tips and margins. (*Lacinaria* Hill; *Liatris squarrosa* Michx.)—Very common, oak woods and sheltered slopes of young dunes; a pretty plant blooming in August and September. A white-flowered form (f. *Benkei* Macbr.) has been collected at Miller and Clarke. Quite variable; one endemic variation is var. *Deamii* (Lunell) Peattie. Involucres cylindric-campanulate. (*Lacinaria* Lunell.)—Sands, Indiana Harbor and perhaps elsewhere.

4. **L. spicata** (L.) Willd. Stems stout, up to 2 m. tall, very leafy; leaves linear, the lower 3-5-nerved; spikes long, slender, crowded; involucre cylindrical, bell-shaped, with oval, obtuse, slightly margined, appressed bracts. (*Lacinaria* Kuntze.)—Commonest of the genus in our area and probably the most splendid flower of all our *Compositae;* in wet grass, around sloughs and ponds, on beach ridges, and on prairies. August, September. Locally sometimes called "horse-tail."

L. pycnostachya Michx., differing from the preceding chiefly in having heads about 5-flowered, is found on prairies of Illinois, close to the western border of our area and may be found within it.

5. SOLIDAGO L. Golden-rod

In our species plants with small heads disposed in simple or compound, erect or often arching racemes or panicles, rarely corymbose; disk and ray flowers both yellow; leaves sessile or subsessile, the stem leaves never heart-shaped; ray flowers 1-6; heads few- to many-flowered; involucre oblong or narrowly bell-shaped; bracts mostly small, numerous and appressed; pappus in 1 or 2 series of copious soft hairs; achenes nearly terete, ribbed.

Corymbosely much branched; heads small, nearly sessile in little clusters in flat-topped corymbs; involucral bracts closely appressed, somewhat sticky; rays 6-20.

Leaves distinctly 2-5-ribbed; heads 20-30-flowered .... *S. graminifolia* 23.

Leaves 1-ribbed or obscurely 3-ribbed; heads 12-20-flowered .... *S. tenuifolia* 24.

Rays fewer than the disk flowers; heads all more or less pedicelled.

Heads in a compound corymb terminating the simple stem, not at all racemose or paniculate.

Leaves flat, not 3-nerved.

Rough and hoary; stem stout; leaves oval or oblong, the basal on naked petioles; heads more than 30-flowered .... *S. rigida* 20.

    - Smooth, slender; leaves oblong-lanceolate, the basal on winged petioles; heads 16-20-flowered...... *S. ohioensis* 21.
  - Leaves somewhat folded, entire, the lower slightly 3-nerved.................................. *S. Riddellii* 22.
- Heads not in corymbs.
  - Heads in axillary clusters.
    - Stem and branches round; leaves lanceolate to oblong. *S. caesia* 1.
    - Stem and branches angular; leaves broadly oval, contracted into winged petioles................ *S. latifolia* 2.
  - Heads not axillary.
    - Heads in a terminal spike-like thyrse.
      - Heads only 2-5 mm. high...................... *S. hispida* 3.
      - Heads 6-12 mm. high.
        - Bog species; inflorescence wand-like............ *S. humilis* 6.
        - Terrestrial species; inflorescence various.
          - Heads long-slender-peduncled.
            - Basal leaves narrowly lanceolate........... *S. racemosa* 4.
            - Basal leaves broadly oblanceolate or obovate.
              - Basal leaves sharply serrate............. *S. Gillmani* 5.
              - Basal leaves nearly entire, crenate only at tip............................ *S. Fischeri* 7.
          - Heads very short-peduncled................. *S. speciosa* 8.
    - Heads in a terminal large panicle, secund on its spreading or arching branches.
      - Leaves 3-nerved.
        - Heads small, the involucre 2-2.8 mm. long...... *S. canadensis* 17.
        - Heads larger.
          - Stem pubescent or scabrous.
            - Leaves lanceolate....................... *S. altissima* 18.
            - Leaves oblanceolate..................... *S. nemoralis* 16.
          - Stem glabrous............................ *S. serotina* 19.
      - Leaves with only 1 principal nerve.
        - Stem densely pubescent or scabrous, leaves more or less so, and rugose.
          - Stem villous-hirsute...................... *S. rugosa* 14.
          - Stem scabrous........................... *S. aspera* 15.
        - Stem glabrous or merely puberulent above.
          - Leaves very rough on the upper surface....... *S. patula* 9.
          - Leaves not rough-pubescent.
            - Racemes few, widely divergent............ *S. ulmifolia* 13.
            - Racemes numerous, spreading, recurved or ascending.
              - Panicle as broad as high; rays 8-12....... *S. juncea* 10.
              - Panicle longer than broad; rays 2-8.
                - Bracts greenish..................... *S. neglecta* 11.
                - Bracts pale straw color............... *S. uniligulata* 12.

1. S. caesia L. Stem smooth, glaucous, much branched and diffuse; leaves sessile, serrate, pointed, lanceolate; heads in very short clusters or somewhat racemose-panicled, small; involucres 2-5 mm. long; rays short.—Woods and wooded dunes, frequent. August-October.

Var. axillaris (Pursh) Gray. Stem simple; leaves thin, narrow longer than the small axillary clusters. With the species.

2. **S. latifolia** L. Smooth, the stem zigzag, 0.3-1 m. tall; leaves oval or broadly ovate, strongly and sharply serrate, the lower abruptly narrowed to winged petioles; heads in very short axillary clusters; rays 3-4. (*S. flexicaulis* L. in part.)—Meadows and woodlands, especially back of the big dunes. Late July to early October.

3. **S. hispida** Muhl. Stems hoary or grayish with soft hairs, simple or paniculate; stem leaves obovate to oblanceolate, the basal rounded, crenate-serrate; involucre 4-6 mm. high with subherbaceous greenish straw-colored tips; rays few and short, orange yellow. (*S. bicolor* L. var. *concolor* T. & G.)—Along the railroad tracks of the Calumet Region; nat. from farther east. July-September.

4. **S. racemosa** Greene. Stems often sticky, usually several, clustered, rather strict and slender, very leafy, the basal and lower leaves oblanceolate, 3-12 cm. long, 5-7 cm. broad, more or less toothed above the middle; stem leaves 10-30 or more, oblanceolate to linear, the uppermost entire and 1-3.5 cm. long, all bearing axillary fascicles; racemes solitary, 5-15 cm. long; involucre 5-8 mm. high with linear bracts; pappus minutely serrulate. (*S. humilis* auths., not Pursh.)—A species of striking habit often growing in large clumps on young dunes and around ponds. July-September.

5. **S. Gillmani** (Gray) Steele. Similar, but much larger, the basal leaves 1.5-3 dm. long, coarsely toothed, the abundant racemes forming a panicle 3-4 dm. long; stem glabrous except the sticky inflorescence; heads long-pedicelled. (*S. racemosa* var. Fernald.)—On dunes and oak woods, one of the characteristic plants of our area; it is an endemic of Lake Michigan and Lake Superior. July-September.

6. **S. humilis** Pursh. Smooth up to the pubescent inflorescence; stem strict, 3-10 dm. tall, simple; leaves thickish, lanceolate, the lower tapering into winged petioles which are partly sheathing at the base, sparsely serrulate or entire; racemes crowded and appressed in a wand-like panicle; involucre 4-6 mm. long, its bracts linear-oblong; rays small, 5-6. (*S. uliginosa* Nutt.)—In peat bogs and wet swales, Miller and eastward. A northern species reaching a southern limit here. July-September.

7. **S. Fischeri** Steele. Stem 8-9 dm. tall, slender, smooth to the inflorescence, the lower leaves petioled, narrowly obovate, generally slightly crenate near the tip, the petioles margined; upper leaves gradually reduced, subpetioled; all leaves thick, firm, green, smooth except at the margins; inflorescence cylindrical, rather loose, generally a simple raceme; heads narrowly campanulate, 5-6 mm. high; bracts rather thick and firm, ovate at the tip; rays 5-9.—An endemic species found on the dunes near Michigan City.

8. **S. speciosa** Nutt. Stem stout, 0.5-2 m. tall, smooth below and often rough above; leaves smooth, thick, only the margins rough, oval or ovate, slightly serrate, the lower large and contracted into margined petioles; heads somewhat crowded in numerous erect racemes forming an ample pyramidal wand-like panicle; involucre cylindric, often glutinous; rays about 5, large.—A showy species, very characteristic of the high dunes and extending as far west as Pine. September, October.

Var. **angustata** T. & G. Low, rarely 1 m. high; leaves more nearly uniform throughout, lanceolate to ovate-lanceolate; inflorescence smaller. (*S. rigidiuscula* Porter.)—Common with the species. August-October.

9. **S. patula** Muhl. Stem sharply 4-angled, smooth, 0.5-2 m. tall; lower leaves long-petioled, larger than the numerous lanceolate upper ones, ovate, acute, serrate, pale, very smooth and veiny underneath but the upper surface very rough; racemes leafy-bracted, short and numerous; heads large.—Tamarack bogs and cat-tail swamps throughout. August, September.

10. **S. juncea** Ait. Stem smooth throughout, 5-12 dm. tall; all leaves tapering gradually to the base, the upper smaller and entire, slightly 3-nerved, the lower elliptic to lanceolate-oval, sharply serrate with spreading teeth, pointed, on long, winged, ciliate petioles; panicle usually as broad as high, composed of dense elongated recurved racemes somewhat corymbosely disposed: rays 8-12.—Sandy fields and oak woods, in and near the big dunes. Late June to September.

Var. **scabrella** (T. & G.) Gray. Foliage scabrous.—High dunes.

11. **S. neglecta** T. & G. Similar, the stem stout, smooth, leafy; leaves thickish, smooth, opaque; panicle usually longer than broad; racemes short and dense; involucre with subherbaceous bracts; rays 3-8.—Peat bogs, swales and prairies from Miller west and south. August to early October.

12. **S. uniligulata** (DC.) Porter. Similar; leaves narrower, fewer; panicle smaller; rays 2-5.—Boggy ground, Tremont, acc. to Churchill.

13. **S. ulmifolia** Muhl. Stem smooth, slender, the branches hairy; leaves thin, tapering to the base, loosely veiny, usually soft-hairy beneath, crinkly like those of the elm; longer branches of the loose panicle chiefly flowerless at base, strongly recurved-spreading; rays about 4.—Sand ridges, frequent. August, September.

14. **S. rugosa** Mill. Stems villous or hirsute with long dirty hairs; leaves crowded, pubescent especially beneath, thin and loosely veiny, not conspicuously rugose, lanceolate or somewhat broader; racemes spreading in a broad pyramidal panicle, much longer than the subtending leaves; rays 6-9; disk flowers 4-7. (*S. altissima* of auths., not L.)—Waste and sandy ground, Calumet District. August, September.

15. **S. aspera** Ait. Stem scabrous-puberulent or short-hispid; leaves strongly rugose, scabrous on both surfaces, thick, appressed-serrate; elongate racemes forming a slender panicle; otherwise similar to the preceding. (*S. rugosa* var. Fernald.)—In sandy soil and dry fields, a coarse species. August-October.

16. **S. nemoralis** Ait. Stems soft or roughish with an ashy gray close puberulence; leaves spatulate-oblong or oblanceolate, mostly subtending axillary fascicles, the lower crenate-toothed and long-pointed, the upper reduced; racemes numerous, dense, at length recurved, forming a compound raceme or panicle which is turned to one side; rays 5-9, bright yellow.—A pretty species in woods and especially characteristic of the high dunes. July to winter.

17. S. **canadensis** L. Stems slender, glabrous below, with narrowly lanceolate, thin leaves with sharply serrate margins and sometimes with minute pubescence beneath on the veins, glabrous above; heads very small, crowded in recurved racemes forming a broad dense pyramidal panicle.—Prairies and meadows throughout. July-September.

18. S. **altissima** L. Stem ashy-pubescent throughout, stout; leaves thick, subentire, lanceolate, minutely scabrous above, short-pilose beneath; heads in crowded, recurved racemes forming dense, high, broadly pyramidal panicles; bracts subherbaceous. (*S. scabra* Muhl.)—Damp soil and ditches, Miller and eastward. August-October.

19. S. **serotina** Ait. Stem stout, smooth, glaucous; leaves smooth on both sides, very sharply serrate above the base, rough-ciliate, lanceolate to oblanceolate; panicle ample, pubescent; rays 7-14, long.—Sandy copses, dunes, and roadside thickets. July-September.

Var. **gigantea** (Ait.) Gray. Involucre 3.2-4 mm. tall; leaves pubescent on the nerves beneath.—Occasional; range of the species.

20. S. **rigida** L. Rough and hoary, stout, very leafy; leaves copiously feather-veined, thick, rigid, oval or oblong, the basal long-petioled, the upper sessile with broad base; corymb dense; involucre long. (*Oligoneuron* Small.)—Dry prairies of the Calumet District, especially southward. August-October.

21. S. **ohioensis** Riddell. Very smooth throughout, with wand-like slender stem; leaves entire, with rough margins, obscurely feather-veined, closely sessile, oblong-lanceolate, the radical ones slightly serrate, tapering into long, margined petioles; involucre short.—A handsome species, growing with *Aster ptarmicoides* and *Senecio aureus* which in habit it resembles. Prairies, swamps, and meadows. August, September.

22. S. **Riddellii** Frank. Smooth and stout, very leafy; branches and pedicels rough-pubescent; leaves linear-lanceolate, partly clasping or sheathing, mostly recurved, the lowest on long keeled petioles; heads numerous, clustered; rays 7-9.—Meadows and prairies; a very showy species of striking habit. August, September.

23. S. **graminifolia** (L.) Salisb. Stem 5-10 dm. tall, smooth; leaves lance-linear, glabrous except for the rough margins and pubescent under-nerves; leafy bracts of the inflorescence ascending; heads sessile, obovoid-cylindric, in dense glomerules; involucral bracts straw-colored. (*Euthamia* Nutt.)—Ditches, fields and wet grassy banks, common throughout.

24. S. **tenuifolia** Pursh. Rather slender, the glabrous stem branched above the middle; leaves spreading or reflexed, linear or linear-lanceolate, 1-ribbed, obscurely 2-nerved, minutely punctate, usually subtending axillary fascicles; heads in glomerules, a few pedicelled; bracts sticky. (*Euthamia* Greene.)—A coastal plain species of curious appearance. It is one of the characteristic plants of our area.

6. BOLTONIA L'Hér.

Pale green, glabrous herbs with thickish entire leaves and corymbed heads, the disk yellow, the rays white or purplish; corollas tubular and radiate; rays numerous; heads many-flowered; involucre hemispherical, the bracts overlapping in a few rows; pappus a series of short scales or of short bristles, accompanied by 2-3 longer awns; achenes very flat, narrowly winged, obovate. Resembling *Aster* except for the pappus.

1. **B. asteroides** (L.) L'Hér. Stems 0.2-3 m. tall; leaves lanceolate; heads middle-sized, loosely corymbed; involucral bracts acuminate; pappus of few or many minute bristles and two or no awns.—In low grounds along the Grand Calumet River. August-October.

7. ASTER L. Aster. Frostflower. Farewell-summer

Perennial, or rarely annual plants with yellowish or brownish disks and white, purple, rose or blue rays, or sometimes in the annual species none; heads mostly paniculate or racemose, rarely solitary, sometimes corymbose; corollas tubular and usually also radiate; rays if present numerous; heads many-flowered, the involucre oblong or hemispheric; bracts overlapping in several series, often with leaf-like or green tips; pappus in 1 or 2 series, copious, soft, white; achenes flattened and nerved.

At least the basal leaves cordate and definitely petioled.
  Heads paniculate .... *A. cordifolius* 7.
  Heads not paniculate.
    Plants, at least the inflorescence, glandular .... *A. macrophyllus* 3.
    Plants not glandular.
      Rays white.
        Leaves rough above .... *A. furcatus* 2.
        Leaves not rough above .... *A. divaricatus* 1.
      Rays blue.
        Leaves entire .... *A. azureus* 6.
        Leaves serrate.
          Stem glabrous .... *A. sagittifolius* 8.
          Stem pubescent .... *A. Drummondii* 9.
None of the leaves at once cordate and definitely petioled.
  Stem leaves with cordate or auriculate clasping bases.
    Involucre glandular-hairy; rays deep violet, purple or rose .... *A. novae-angliae* 4.
    Involucre not glandular.
      Bracts of the involucre essentially equal or only the outer ones shorter or broader.
        Tips of the bracts acute, recurved-spreading .... *A. novi-belgii* 22.
        Tips of the bracts long-attenuate, ascending, not recurved .... *A. puniceus* 23.
      Bracts distinctly overlapping, the outer series successively smaller.
        Plant smooth and glaucous .... *A. laevis* 10.
        Plant not glaucous.
          Plant ashy-pubescent .... *A. amethystinus* 13.
          Plant green though somewhat pubescent .... *A. paniculatus* 19.
  Stem leaves narrower or cordate or rounded at base but not clasping.

- Leaves silvery-silky on both surfaces, entire........... *A. sericeus* 5.
- Leaves not silvery-silky.
  - Heads in flat-topped corymbs.
    - Leaves rigid, linear-lanceolate; pappus simple ..... *A. ptarmicoides* 26.
    - Leaves not rigid, broader; pappus double......... *A. umbellatus* 24.
  - Heads paniculate, racemose, or rarely solitary.
    - Stems copiously pubescent.
      - Leaf-like tips of the more or less bristly-ciliate involucral bracts spreading or recurved at the tip; leaves linear.
        - Rays blue; leaves not rigid................. *A. amethystinus* 13.
        - Rays white; leaves rigid, crowded............ *A. multiflorus* 14.
      - Bracts not leaf-like, not spreading, the tips short, green and appressed.
        - Stems villous............................ *A. ericoides* var. 12.
        - Stems pubescent.......................... *A. lateriflorus* 17.
    - Stems essentially glabrous.
      - Involucre 5 mm. or less high.
        - Bracts with firm subulate tips............... *A. ericoides* 12.
        - Bracts without firm subulate tips.
          - Bracts with conspicuous elliptic or subrhombic green tips.
            - Heads terminating minutely leafy branchlets........................... *A. dumosus* 15.
            - Heads paniculate or if few then on branchlets bearing larger leaves.......... *A. salicifolius* 20.
          - Bracts attenuate, without conspicuously dilated tips.
            - Rays violet or red..................... *A. junceus* 21.
            - Rays white or pale lavender.
              - Branches ascending-paniculate; heads in racemose-paniculate clusters.
                - Heads (including rays) 1-1.5 cm. broad; bracts green, slender... *A. Tradescanti* 18.
                - Heads larger; bracts green, chiefly at apex...................... *A. paniculatus* 19.
              - Branches divaricate; heads small; racemes 1-sided.
                - Leaves narrowly lanceolate, scarcely-serrate; bracts linear-attenuate. *A. vimineus* 16.
                - Leaves broader, serrate; bracts with rather conspicuous, upwardly-dilated midrib.............. *A. lateriflorus* 17.
      - Involucre more than 5 mm. high.
        - Bracts with definite firm subulate tips........ *A. Faxoni* 11.
        - Bracts without firm subulate tips.
          - Leaves at most 4.5 cm. long............... *A. linariifolius* 25.
          - Leaves longer.
            - Rays inconspicuous or none; plant annual. *A. angustus* 27.
            - Rays conspicuous; plants perennial.
              - Bracts with conspicuous colored tips.
                - Heads terminating minutely leafy branchlets.................. *A. dumosus* 15.

  Heads paniculate or if few, then on branchlets bearing larger leaves.................... *A. salicifolius* 20.
Bracts without conspicuous colored tips.
  Bracts of several lengths............ *A. paniculatus* 19.
  Bracts subequal.................... *A. junceus* 21.

1. A. **divaricatus** L. Slender, 3-10 dm. tall, zigzag; leaves coarsely toothed; bracts thin, papery; rays 6-12.—Woodlands, Tremont, acc. to Churchill. August-October.

2. A. **furcatus** Burgess. Stem slender, 3-6 dm. tall, uniformly leafy; leaves thick above, the upper ones mostly sessile and with broad-winged, laciniate bases, the lower short-petioled and a little heart-shaped; tufts of basal leaves few or none; heads large, 1-1.5 cm. high, few; involucre top-shaped, of 4-5 rows of pale, pubescent, blunt bracts, the inner dark-tipped; rays 6-18, 1 cm. or more long, narrow, white.—In low dune woods near Tremont, infrequent. Summer and autumn.

3. A. **macrophyllus** L. 0.3 to 1.5 m. tall, coarse; inflorescence and frequently the branches sticky; basal leaves large, cordate, forming rosettes at the base of the plant; stem leaves smaller and narrower; involucre obovoid-bell-shaped; bracts regularly overlapping in several rows, appressed, nearly destitute of herbaceous tips, the outer short, ovate, blunt, and pubescent, the inner narrow, long, often roseate-margined; rays 6-18, blue, white or violet; heads in open corymbs.—In oak barrens and richer woods, high dune region. August, September.

Var. **velutinus** Burgess. Stems villose; leaves truncate or tapering, not cordate except the lowest, pilose beneath.—With the species.

Var. **pinguifolius** Burgess. Stems 5-6 dm. tall, smooth, as are many of the shining, greasy, basal leaves.—With the species.

4. A. **novae-angliae** L. Stout, hairy, 0.5 to 2.5 m. tall; leaves auriculate-clasping, entire, acute, lanceolate, minutely pubescent; heads in corymbose panicles; involucre hemispheric, glandular; bracts very narrow, loose, spreading; rays numerous, large, violet to purple or sometimes rose or rarely white.—A splendid flower; fields and ditches back of the high dunes. Also prairies. August-October.

5. A. **sericeus** Vent. 2 to 6 dm. tall, branched, slender; leaves all sessile and entire, silvery-silky on both sides, lanceolate or oblong; heads mostly solitary, terminating short branchlets; involucre imbricated in several rows, the bracts leaf-like, spreading; rays numerous, showy, purple-violet.—On prairies of the Calumet District or sometimes in woods of the dune region. A western species reaching an eastern limit here. August-October.

6. A. **azureus** Lindl. Stem rough, racemose-compound above, with rigid and slender branches; leaves practically entire, the lower heart-shaped, on long petioles, the others sessile, linear or lanceolate, the topmost very small, all rough; involucre inversely conical, the bracts short, green-tipped, appressed; heads racemose or panicled, medium-sized; rays bright blue.—Prairies and thickets throughout. September-October.

7. A. **cordifolius** L. Stem much branched above, nearly smooth; branches widely spreading; leaves minutely scabrous above, sharply serrate, thin, the lower cordate on slender ciliate petioles; involucre inversely conical, the bracts with short green points, appressed; rays pale blue or white; heads small, numerous, paniculate.—Copses and ditches throughout. August-October.

8. A. **sagittifolius** Wedemeyer. Stem rigid, erect, smooth or slightly hairy, with ascending branches; leaves pointed, ovate-lanceolate, the lower on winged petioles, the upper narrower; heads racemose, numerous; involucre oblong; bracts linear, tapering into loose tips; rays pale blue or white. (*A. paniculatus* Muhl.)—Sandy roadsides and oak woods, a characteristic plant of the high wooded dunes. August-October.

9. A. **Drummondii** Lindl. Similar to the preceding, pale, finely pubescent; leaves mostly on margined petioles or the upper sessile, heart-shaped below, the upper lanceolate; bracts acute.—In open soil of the Calumet District and western Dunes. Summer and autumn.

10. A. **laevis** L. Smooth; 0.5-1 m. tall, rather stout; leaves thickish, mostly entire, lanceolate or somewhat broader, the upper ones clasping by auricled or cordate bases; involucre hemispherical, with closely imbricated bracts having whitish bases and abrupt green tips; rays blue-violet.—A handsome species in dry soil throughout. August-October.

11. A. **Faxoni** Porter. Similar; stem leaves linear; heads paniculate; bracts lanceolate-subulate, the outer much shorter; rays white. (*A. polyphyllus* Willd., not Moench.)—Low fields and grassy pastures back of the big dunes. August-October.

12. A. **ericoides** L. 3-9 dm. tall, smooth; branchlets simple or the peduncles racemose along the upper side on wand-like spreading branches; lower leaves oblong-spatulate; upper leaves linear-awl-shaped; heads 6 mm. high or less, with hemispheric involucre and bracts with long slender green tips; rays white.—A somewhat heather-like plant, in dry open ground, Miller, etc. September, October.

Var. **Pringlei** Gray. Low, slender, its branches few, erect; heads small, scattered, mostly solitary.—At Pine, acc. to Benke, and perhaps elsewhere.

Var. **villosus** T. & G. The stem, and often the narrow leaves hirsute. (Var. *pilosus* Porter.)—Dune meadows, Tremont, and perhaps elsewhere.

Var. **platyphyllus** T. & G. Stout, the stem and branches densely white-villous; leaves pubescent, lanceolate or oblong-lanceolate; heads as in the type, but bigger.—Dune meadows, Tremont, and perhaps elsewhere.

13. A. **amethystinus** Nutt. 0.5-1.5 m. tall, much branched, hirsute or puberulent; leaves small, linear, entire, not rigid; heads numerous, small, racemose; the bracts bristly-ciliate, spreading, the tips herbaceous; rays light clear blue or rarely violet.—Possibly a hybrid between *A. novae-angliae* and *A. multiflorus*. It has been collected, rarely, near Clarke. September, October.

14. A. **multiflorus** Ait. Similar, pale or hoary, much branched and bushy, the heads crowded on the spreading racemose branches; leaves rigid, crowded, the margins rough or ciliate; heads small, with hispidulous ciliate bracts passing insensibly into the upper leaves; rays white.—In dry sandy soil of the Calumet Region. August-October.

15. A. **dumosus** L. 3-9 dm. tall, smooth, with divergent slender branches and crowded entire linear leaves with rough margins; heads small, numerous, scattered, terminating minutely leafy slender branchlets; involucre bell-shaped, with obtuse green-tipped bracts; rays purple or blue.—In pine woods and sandy wastes, Pine. Also dune meadows. August, September.

Var. **strictior** T. & G. Branches ascending and rigid. Umbach (acc. to Pepoon) reports it from Mt. Tom.

16. A. **vimineus** Lam. 0.5-2 m. tall, bushy, smooth, the long branches almost horizontally spreading; leaves linear or narrowly lanceolate, long, all but the upper toothed; heads small, crowded, in one-sided racemes on minutely leafy branchlets; bracts slender and acute; rays white.—Moist soil, Calumet Region. Also dune meadows. August, October.

17. A. **lateriflorus** (L.) Britton. Much branched, pubescent; leaves tapering at each end, sharply serrate in the middle, lanceolate; flowers as in the preceding but larger, with white or pale bluish rays. (*A. diffusus* Ait.)—Thickets and fields, throughout. August-October.

Var. **glomerellus** (T. & G.) Burgess. Scarcely branched; leaves somewhat hispid, oblong-lanceolate; inflorescence small, axillary or short, terminal and spicate.—In rich woods, Tremont.

18. A. **Tradescanti** L. 0.5-1.5 m. tall, branched; leaves long, tapering, narrow, the lower serrate in the middle; heads panicled or racemed; involucre small, with narrow acute bracts which are partly green down the middle; rays short, white or purplish.—Thickets, sandy fields, and prairies, frequent throughout. August-October.

Var. **foliosus** (Ait.) Gray. Leaves entire, linear; branches ascending; heads more scattered, paniculate.—Dune Park, and perhaps elsewhere.

19. A. **paniculatus** Lam. Similar, taller; heads rather large and rays long, white or purplish.—Wet meadows and thickets throughout. August-October.

20. A. **salicifolius** Ait. Similar, the leaves shorter, firmer, often scabrous, mostly entire; involucre more imbricated, the firmer bracts with shorter green tips; heads large, racemose-clustered; rays pale violet.—In rich dune woods. August-October.

21. A. **junceus** Ait. 3-9 dm. tall, slender, mostly simple; leaves linear, entire or sparingly denticulate, scabrous on the margins; heads long, purple, roseate or white.—Wet meadows and marshes throughout. June-September.

22. A. **novi-belgii** L. 2-10 dm. tall, slender; leaves oblong or narrower; upper leaves partly clasping and auriculate; heads 1 cm. high; bracts linear to spatulate, somewhat herbaceous and firm, unequal, the tips often spreading; rays light blue to white.—Lyon reports this

beautiful autumn-flowering aster from moist open soil, Mineral Springs. It is usually not considered to range into the Middle West.

23. **A. puniceus** L. Stem tall, stout, rough-hairy all over or in lines, usually purple below, panicled above; flowering branches much exceeding the subtending leaves; leaves oblong-lanceolate, regularly and coarsely serrate, rough above, hispid on midnerve below, pointed, scarcely narrowed to the auriculate base; heads large, with slender, loose, sometimes leafy bracts and long showy lilac-blue to white rays.—Low thickets, wet pastures, and roadsides, ditches and streams; frequent. A very handsome species. August-October.

Var. **demissus** Lindl. Leaves elongate-lanceolate; inflorescences shorter than the subtending leaves. —In backwaters of Trail Creek, Michigan City and perhaps elsewhere.

Var. **firmus** (Nees) T. & G. Stem mostly naked below, smooth and not purple; leaves smooth beneath, serrate.—In wet soil around Lake George and Wolf Lake.

24. **A. umbellatus** Mill. 0.3-2.5 m. tall, leafy to the top, practically smooth; leaves veiny, lanceolate, elongated, tapering at each end; heads very numerous, in compound flat corymbs; bracts close, obtuse; rays few, large, white; pappus double, the inner of long capillary bristles, the outer of short rigid bristles. (*Doellingeria* Nees; *Diplopappus* Hook.)—A beautiful species of striking habit; woods, and swamps throughout, especially behind the big dunes. August, September.

25. **A. linariifolius** L. Low, several stems clustered from a woody root; leaves small, rough-margined, crowded, passing into the rigid, acutish bracts, 1-nerved, veinless, rigid, linear; heads large, solitary on simple branches, with showy violet rays; pappus double but not distinctly so. (*Ionactis* Greene; *Diplopappus* Hook.)—A striking and handsome little plant in sandy openings and in oak woods of the big dunes. August-October.

26. **A. ptarmicoides** T. & G. Low, with clustered stems; leaves long, acute, linear-lanceolate, tapering, 1-3-nerved, rigid, entire, with rough margins; heads small, in a flat corymb; bracts short, often scarious-edged or dry; rays white, short but showy. (*Doellingeria* Nees; *Unamia alba* Rydb.)—A curious and attractive species. Limestone rock, prairies, and rich meadows of Long Lake. August-October. Often with *Solidago ohioensis* which it resembles in habit. Mrs. Chase has reported a form from our area in which the leaves are larger and have 1-5 short teeth. From near our western limits var. *lutescens* (Hook.) Gray with pale yellow rays has been collected and may be watched for within our borders.

27. **A. angustus** (Lindl.) T. & G. The only annual species of our area, low, nearly smooth, branching; leaves very slender, entire, more or less ciliate; involucre bell-shaped; bracts linear, nearly equal, the outer leafy and loose; rays short or none; corollas of the marginal flower reduced to mere tubes; style elongated; pappus copious, very soft. (*Brachyactis* Britton.)—An unattractive species but odd in appearance, of the Great Plains and Siberia, spreading eastward along railroad tracks. Probably native with us. August, September.

8. **ERIGERON** L. Fleabane

Perennial or annual plants with few or many rays, these often showy, rarely minute; disk yellow; rays white, blue, purple, or rose; heads solitary or corymbed on naked peduncles or naked scapes; corolla tubular and ligulate; heads many-flowered; involucre of numerous narrow appressed bracts which are little or scarcely at all overlapping and are never leaf-like or conspicuously green-tipped; pappus of a row of long soft hairs often intermixed with smaller ones and an outer row of short chaffy scales; achenes flattened, pubescent, 2-nerved.

Resembling *Aster*, but distinguishable by its pappus.

Rays long, conspicuous, crowded in one or more rows.	
Pappus simple; low vernal plants with basal rosettes and one to several large heads with blue or purple flowers.	
Stem leafless above; rays about 50, blue..............	*E. pulchellus* 1.
Stem leafy above; rays innumerable, rose-purple.......	*E. philadelphicus* 2.
Pappus double, the outer a crown of minute scales, the inner of deciduous fragile bristles; taller, annual species without basal rosettes, the heads in ample corymbs, white or slightly bluish.	
Leaves sharply and coarsely toothed, the lowest ovate, tapering into a margined petiole; rays not twice the length of the bristly involucre............	*E. annuus* 3.
Leaves entire or nearly so, the lowest oblong or spatulate, tapering to a slender petiole; rays twice the length of the minutely hairy involucre................	*E. ramosus* 4.
Rays inconspicuous, in several rows, scarcely longer than the simple pappus; annuals.	
Stem erect, wand-like; heads panicled..................	*E. canadensis* 5.
Stem diffuse and decumbent; heads loosely corymbed.....	*E. divaricatus* 6.

1. **E. pulchellus** Michx. (*Robin's Plantain.*) Stem simple, hairy, producing 1-9 large heads at the top on slender nodding pedicels; basal leaves obovate and spatulate, sparingly toothed, the stem leaves partly clasping, remote, chiefly near the base.—A pretty species appearing in early spring in woods and thickets, throughout. April-June.

2. **E. philadelphicus** L. Similar; the leaves thin, with a broad midrib, oblong, mostly entire and clasping by a heart-shaped base, the basal spatulate and toothed; rays very narrow; heads smaller.—Low ground, Pine and Clarke and in dune meadows; infrequent. Spring.

3. **E. annuus** (L.) Pers. (*Sweet Scabious.*) Stem stout, branched, covered with coarse hairs; leaves coarsely and sharply toothed; rays white tinged with purple; heads fairly broad.—A coarse weed of roadsides, railroad tracks, etc. Summer.

4. **E. ramosus** (Walt.) BSP. (*Daisy Fleabane.*) Stem slender, panicled-corymbose at the summit, roughish; leaves rough or nearly smooth, entire or nearly so; rays white; heads narrower.—An inconspicuous but abundant plant of the dunes, dune woods, and sand plains. Summer.

5. **E. canadensis** L. (*Horse-weed.*) Tall, stout, bristly-hairy; leaves linear, nearly entire, the radical ones cut-lobed; heads very numerous and small, panicled. (*Leptilon* Britton.)—An unsightly weed of farms, roadsides and waste places. Summer.

6. **E. divaricatus** Michx. 1-3 dm. long; leaves entire, linear or awl-shaped; rays purple. (*Leptilon* Raf.)—Prairies of the Calumet District, almost certainly, as it occurs just over the line in Illinois. Summer.

9. ANTENNARIA Gaertn. Everlasting. Ladies' Tobacco. Pussy Toes

Perennial, often creeping and stoloniferous plants with more or less white-woolly leaves and stems, the leaves entire, chiefly basal and subrotund; the male plants are smaller than the female; flowers all tubular, white (the styles sometimes crimson), the sexes on different plants; female corollas very slender; involucre hemispheric, of small dry papery bracts which overlap, having, in the male plants, white petal-like tips; pappus in the male plants somewhat thickened and barbellate, in the female plants copious and capillary, in a single row, united at base, deciduous as a ring, not by separate hairs.

Basal leaves small, 2-5 cm. long.	
Stolons decumbent, leafy only at the tip................	*A. neglecta* 5.
Stolons ascending at tip, leafy throughout...............	*A. neodioica* 4.
Basal leaves long, 5-12 cm. in length, with 3-5 main nerves.	
Heads small; involucre 6-8 mm. high; stems slender......	*A. plantaginifolia* 1.
Heads large, 8-10.5 mm. high; stems stoutish.	
Basal leaves bright green above......................	*A. Parlinii* 6.
Basal leaves dull above, tomentose.	
Basal leaves mostly broad-ovate or rhombic-obovate, narrowed from near the middle to the acute or blunt tip..................................	*A. fallax* 2.
Basal leaves from spatulate to narrowly spatulate-obovate with rounded tips....................	*A. occidentalis* 3.

1. **A. plantaginifolia** (L.) Richards. Stems 1-5 dm. tall; basal leaves with rounded or acutish tips, distinctly 3-nerved; stem leaves scattered, lanceolate, acuminate, all leaves dull green above and whitish below and covered with cobwebby hairs; heads loosely or densely corymbose; bracts of the female heads linear, purplish or green with pale tips; styles crimson.—A common and pretty little plant of oak barrens and dune woods. Spring and early summer.

2. **A. fallax** Greene. Stems 1-4 dm. tall, sometimes glandular; basal leaves large, 3-5-nerved; lower stem leaves oblong-lanceolate, crowded; corymb dense; bracts of the female heads attenuate to scarious tips or broad and petal-like; styles pale or crimson. (*A. mesochora* Greene.)—Dry wooded dunes and borders of thickets back of the high dunes. Spring.

3. **A. occidentalis** Greene. Stem at first low, then elongating to 4 dm.; basal leaves with 3 nerves; stem leaves conspicuous, lanceolate; inflorescence subcapitate; bracts with conspicuous white tips; styles crimson.—In rich open soil of the Calumet District. Spring and early summer.

4. **A. neodioica** Greene. Stems slender, 0.5-4 dm. tall; basal leaves obovate; stem leaves scattered, small and few; corymbs ordinarily loose; bracts with papery tips; styles pale.—Open woods and fields, Clarke and perhaps elsewhere. Summer.

5. **A. neglecta** Greene. Stems 0.3-4 dm. tall, slender, becoming much longer at fruiting time; basal leaves spatulate-obovate to cuneate-spatulate; stem leaves few; heads at first crowded, later looser and racemose as the axis of the inflorescence lengthens; involucre 7-9 mm. high, frequently purplish at base.—Fields, open woods, rare in the dune area. Spring.

6. **A. Parlinii** Fernald. 3-5 dm. tall, stout; stems and leaves purplish-glandular; stolons assurgent; lower leaves crowded; terminal leaves larger, the basal leaves broadly obovate or spatulate, obtuse, 3-nerved; heads of the pistillate plant corymbose; involucre of about 3 rows of bracts; styles turning crimson. (*A. arnoglossa* Greene.)—The only record is Lyon's report, from a wooded dune at Tremont.

10. GNAPHALIUM L. Cudweed

Woolly annuals (outside our range often perennials), frequently reclining, with whitish or yellowish corollas and sessile decurrent leaves; flowers all tubular; heads many-flowered; bracts of the involucre overlapping in several rows, dry and papery; pappus a single row of rough bristles; achenes flattish or roundish.

Similar to *Antennaria*, but the sexes on the same plant; some exotic species are showy; ours are inconspicuous weeds.

Tall erect plants with whitish bracts of the involucre and smooth achenes..................................	*G. polycephalum* 1.
Low, mostly diffuse plants with brown involucral bracts and usually scabrous achenes..........................	*G. uliginosum* 2.

1. **G. polycephalum** Michx. (*Common Everlasting, Rabbit's Tobacco.*) 3-9 dm. tall, aromatic; leaves tapering at base, undulate, lanceolate, smoothish above; heads clustered at the summit of panicled corymbose branches. (*G. obtusifolium* L.)—A common weed throughout, which makes rather a handsome long-lasting bouquet as the papery bracts do not wither. The leaves are sometimes smoked. Summer, autumn.

2. **G. uliginosum** L. (*Low Cudweed.*) A prostrate or assurgent plant with spatulate-oblanceolate or linear leaves and small heads in terminal, sessile, capitate clusters subtended by leaves.—A weed in our area, in the Calumet District, probably nat. from Eu.; native in the far north. Summer.

11. INULA L. Elecampane

Coarse plants with large yellow heads and alternate simple leaves, in our species rough-textured; both disk and ray flowers present; heads many-flowered; involucre hemispherical, the outer bracts leaf-like; pappus of copious soft hairs; achene 4-5-ribbed.

1. **I. Helenium** L. Tall stout perennial with large leaves which are woolly beneath, those from the thick roots petioled, the others clasping; rays very numerous, narrow, yellow; heads large.—A coarse, sunflower-like weed with mucilaginous root yielding the drug elecampane. Nat. from Eu. in thickets and pastures near Tremont; infrequent. Summer.

12. SILPHIUM L. Rosin-weed

Coarse perennials with yellow rays and large corymbose-panicled heads; plants suffused with a resinous oil and terebinthine odor; both radiate and tubular corollas present, the rays numerous; heads many-flowered; involucre broad and flat, with the outer scales loose and herbaceous, the inner passing into the linear chaff of the receptacle; pappus none or of 2 teeth, confluent with the winged margins of the fruit which is broad and flat and notched at the top.

Resembling the sunflowers (*Helianthus*). In our region characteristic primarily of the prairie districts.

Leaves alternate; stem round.	
Stem stout, rough-bristly	*S. laciniatum* 1.
Stem smooth, slender	*S. terebinthinaceum* 2.
Leaves, at least some of them, opposite; stem 4-angled or square.	
Pairs of leaves heart-shaped and clasping but their bases not joined	*S. integrifolium* 3.
Upper pairs of leaves with their bases completely joined around the stem	*S. perfoliatum* 4.

1. **S. laciniatum** L. (*Compass Plant.*) Stem leafy, 1-4 m. tall; leaves pinnately parted, petioled but dilated and clasping the stem by the base of the petiole, their divisions linear or lanceolate, cut-lobed or pinnatifid, rarely entire; heads few, 0.5-1 dm. broad.—On prairies of the Calumet region. A beautiful plant which derives the common name from its reaction to sunlight which causes it sometimes to present its leaves north and south. Summer.

2. **S. terebinthinaceum** Jacq. (*Prairie Dock.*) Stem 1-3 m. tall, leafless except toward the base, panicled above; leaves ovate and ovate-oblong, somewhat heart-shaped, serrate-toothed, thick, rough especially below, on slender petioles; heads several to many, very large.—A coarse, rank-smelling, handsome plant common on the prairies and also found in oak openings of the big dunes. Summer.

Var. **pinnatifidum** (Ell.) Gray. Leaves deeply cut and pinnatifid, resembling those of the preceding species. With the species.

3. **S. integrifolium** Michx. Stem rough or smooth, stout, rigid, 4-angular, grooved, 0.5-2 m. tall; leaves roundish heart-shaped and partly clasping, tapering to a sharp point, entire and denticulate, rigid, lanceolate-ovate, rough-pubescent or nearly smooth, thick; heads in a forking corymb, large.—Dry prairies and thickets throughout. Summer.

4. **S. perfoliatum** L. (*Cup Plant.*) Stem stout, branched above, leafy, 1-3 m. tall; leaves coarsely toothed, the lower on long winged

petioles, the upper joined by their bases and forming a sort of cup; heads corymbose.—A striking plant; ditches near Dyer and elsewhere on the prairies in the southern Calumet District. Summer. Insectivorous?

13. PARTHENIUM L. Prairie Dock

Our species coarse scabrous perennials pervaded by a rank odor similar to rose-geranium; heads woolly, white, disposed in corymbs; both ray and disk flowers present, the rays inconspicuous, erect, scarcely exceeding the dense woolly disk; heads many-flowered; involucre hemispherical, of 2 rows of short bracts; receptacle chaffy, conical; achene narrowly callous-margined; pappus none.

Guayule rubber is obtained from a species of the Southwest.

1. **P. integrifolium** L. A coarse herb. 1 m. or less tall from a thickened rootstock, rather rough throughout, or the stems glabrous below; leaves oblong or ovate, crenate-toothed or somewhat cut-lobed below the middle, thick, stiff, grayish-green, the basal ones large; heads small, in a dense flat corymb.—A curious plant, characteristic of the prairies but in the high dune country also found in meadows and by roadsides. Summer.

14. IVA L. Marsh Elder

Our species herbaceous annuals, coarse-growing; leaves thick, opposite; heads small, nodding, greenish-white, in panicled spikes or racemes; corollas evident or in our species none; ray flowers none; male and female flowers in the same head, the latter wholly marginal and few; anthers nearly separate; bracts of the involucre roundish, few; receptacle small, with narrow chaff among the flowers; pappus none.

1. **I. xanthifolia** Nutt. Tall coarse roughish plant with nearly all the leaves opposite, minutely hoary, rhombic, ovate or the lowest heart-shaped, doubly and incisely toothed and obscurely lobed; heads small, crowded in terminal and axillary panicles.—Prairies of the Calumet District. Also vacant lots around towns. Wind-pollinated. Summer.

15. AMBROSIA L. Ragweed

Coarse weedy plants with more or less lobed or dissected leaves and panicled racemes of tiny green or greenish-yellow flowers; ray flowers none; sexes in different heads on the same plant, the female 1-3 together in the axils or bracts at the base of the racemes, the male above; male involucres of 7-12 bracts, top- or saucer-shaped, enclosing 5-20 flowers; chaff sometimes present on the receptacle; female involucre top-shaped or ellipsoid, with 4-8 spiny lobes closely adherent to the single flower and ovoid achene; style branches protruding; pappus none.

The Ambrosias are wind-pollinated plants. Their pollen is the principal cause of hay-fever.

Leaves all, except the uppermost among the inflorescence, opposite, palmately 3- or 5-lobed or often undivided.. *A. trifida* 1.
Leaves opposite and alternate, 1-2-pinnatifid.
  Leaves thin, smoothish above; fruit with 6 short spines... *A. elatior* 2.
  Leaves thickish, hoary on both sides; fruit nearly or quite spineless.. *A. psilostachya* 3.

1. **A. trifida** L. (*Great Ragweed.*) Stout, 1-6 m. tall, roughly hairy on stem and on the large, deeply 3-lobed leaves; petioles winged. —A common weed, roadsides and fields. Summer.

2. **A. elatior** L. 0.2-2.5 m. tall, much branched, roughly hairy; leaves hoary on the under side only, at least the lower ones mostly bipinnatifid with acute, forward-pointing, narrow segments; staminate heads 3 mm. broad; involucre slightly oblique. (*A. artemisiifolia* of auths., not L.)—A very common weed in waste ground and fields. Summer.

Var. **artemisiifolia** (L.) House. Similar, the lower leaves mostly once pinnatifid with obtuse oblong segments; involucre 4 mm. broad, saucer-shaped.—With the typical form.

3. **A. psilostachya** DC. Roots running, slender; stem rough and hoary; leaves pinnatifid with acute lobes.—Along railroad tracks and around cities. Nat. from Great Plains. Summer.

16. XANTHIUM L. Cocklebur

Coarse weedy annuals in our species with alternate, toothed or lobed but not deeply divided leaves; flowers as in *Ambrosia* but the male involucre of separate bracts, the female thick, ovoid, enclosing 2 flowers and closely investing the achene as a bur with hooked prickles.

Beaks of the bur essentially straight.................... *X. pungens* 1.
Beaks of the bur hooked or strongly incurved.
  Body of the bur less than 2 times as long as broad; prickles numerous. .... *X. italicum* 2.
  Body of the bur more than 2 times as long as broad; prickles few.. *X. echinatum* 3.

1. **X. pungens** Wallr. Low, often prostrate; leaves 3-lobed, cordate, broadly ovate; burs glandular-puberulent, granular, or glabrous, 13-17 mm. long, 5-9 mm. thick; prickles few. (*X. canadense* of auths., not Mill.?, *X. pennsylvanicum* Wallr.?, *X. glabratum* Britton.) —The nomenclature of this species is uncertain. It is reported as *X. canadense* by Pepoon and as *X. pennsylvanicum* by Lyon. Its occurrence in our area, too, is uncertain except Lyon's report from a roadside at Keiser.

2. **X. italicum** Mor. Similar but the broad bur 4-8 mm. long, 5-8 mm. thick, the prickles numerous, 3-7 mm. long. (*X. commune* Britton.)—This is the only species of which the author is certain as regards our area. A noxious weed nat. from Eu.

3. **X. echinatum** Murr. Similar to the preceding two, but the body of the bur 15-22 mm. long and 8-12 mm. thick, all parts densely

pubescent.—This is stated positively by Pepoon as the common beach bur of our area, and was so always reported by Hill, and leading manuals give it as the prevalent beach bur of the Great Lakes. The author, however, has been able to discover no true specimens of it from our area and Millspaugh and Sherff, who have had abundant Middle Western material to examine, do not cite specimens of it from our area in their monograph of the genus. On inspection, Umbach's herbarium, on which Pepoon's "Flora" was so largely based, does not reveal this species from our area, nor does the herbarium of Field Museum.

X. spinosum L., a tall spiny weed with large sparsely prickly burs, is common on dump heaps of many near-by regions, nat. from Eu., and may be watched for in the city districts of our region.

17. HELIOPSIS Pers. Ox-eye

Perennials with terminal heads of yellow flowers and 3-nerved opposite leaves; both disk and numerous ray flowers present; heads many-flowered; involucral bracts equal, in 2 or 3 rows, the outer leaf-like and spreading, the inner short; receptacle conical, with linear chaff; pappus none or of 2 or 3 obscure teeth or crown-like and chaffy with 2 or 3 conspicuous teeth; achenes truncate, angular.

Resembling *Helianthus* (sunflower).

Plant nearly smooth; pappus none or 2-4 obscure teeth..... *H. helianthoides* 1.
Plant roughish; pappus crown-like and chaffy or of 2-3 conspicuous teeth.................................. *H. scabra* 2.

1. **H. helianthoides** (L.) Sweet. 0.3-1.5 m. tall; leaves narrowly pointed, ovate-lanceolate or oblong-lanceolate, sometimes ternate; rays linear.—Around Miller, on banks and in thickets. August.

2. **H. scabra** Dunal. Similar, the leaves less narrowly pointed and very rough, the upper often entire; rays linear or oblanceolate or broadly oblong.—A coarse plant found on prairies of the Calumet District. August.

18. RUDBECKIA L. Black-eyed Susan

Perennials with single showy heads; both disk and ray flowers present, the rays yellow, not drooping, the disk purple or brown or black, dome-shaped or columnar; leaves alternate; involucre hemispheric, with 2 rows of leafy, spreading bracts; receptacle conical or columnar, with short chaff; pappus none or a minute crown; achenes 4-angled, not margined, flat at top.

Leaves undivided; disk hemispherical in fruit............... *R. hirta* 1.
Leaves divided or deeply cut; disk columnar in fruit........ *R. laciniata* 2.

1. **R. hirta** L. Rough and bristly-hairy biennial, 3-10 dm. tall, stout, naked above; lower leaves petioled and 3-nerved, spatulate, the upper oblong or lanceolate and sessile; rays about 14, more or less

exceeding the dull brown involucral disk, its chaff acute, hairy at the tip; pappus none.—Common, handsome weed, in fields, woods and prairies throughout. Summer.

2. **R. laciniata** L. (*Wild Golden-glow.*) 0.5-2 m. tall, smooth, branching; lower leaves pinnate with leaflets 5-7-cut or 3-lobed; heads long-peduncled; disks at first globular, then long cone-shaped, greenish-yellow; rays drooping, oblanceolate.—In thickets and sandy fields, frequent. Summer.

19. **BRAUNERIA** Neck. Purple Cone-flower

Perennials with stout stems and alternate 3-5-nerved leaves; flower heads large, solitary, with purple or whitish rays; both disk and ray flowers present, the rays 10 or more, the heads many-flowered; involucre depressed-hemispheric, the bracts narrow, spreading, overlapping in 2-4 rows; receptacles conical, covered with slender, furrowed, spiny chaff which exceeds the disk; pappus a short-toothed crown; achenes 4-angular and plump.

Rays spreading, 2-2.5 cm. long...........................	*B. angustifolia* 1.
Rays drooping, 4-7 cm. long.............................	*B. pallida* 2.

1. **B. angustifolia** (DC.) Heller. Low, 2-4 dm. tall, hirsute; leaves 3-nerved, entire, attenuate at base, lanceolate and linear-lanceolate; heads rather small; rays 2-3-toothed, purplish or white. (*Echinacea* DC.)—A lime soil plant, found on prairies of the Calumet District. May-August. It has probably been nat. from the Western prairies.

2. **B. pallida** (Nutt.) Britton. Similar to the preceding, but 1 m. or less tall, the rays 2-toothed. (*Echinacea* Britton.)—Railroad embankments of the Calumet District, and east to Dune Park, nat. from the Western prairies. Summer.

20. **LEPACHYS** Raf. Cone-flower

Perennials with smooth grooved stems and alternate, pinnate leaves, cone-like purple disks, and drooping yellow rays; heads single, many-flowered, showy; both disk and ray flowers present; involucre small and low, of several series of small bracts; receptacle columnar, bearded at the summit, with thickened truncate chaff which partly embraces the fruit; pappus of 2 short teeth or none; achenes flat, winged.

Leaflets 3-7; disk ellipsoid, shorter than the rays which are 5 cm. long.....................................	*L. pinnata* 1.
Leaflets 5-9; disk columnar, as long as or longer than the rays which are 3 cm. long or less......................	*L. columnifera* 2.

1. **L. pinnata** (Vent.) T. & G. 0.5-1.5 m. tall, branching, slender, hoary with minute appressed hairs; leaflets acute, lanceolate; rays light yellow; receptacle when bruised is anise-scented. (*Ratibida* Barnhart.)—A handsome plant, in sandy fields, throughout. June-July.

2. **L. columnifera** (Nutt.) Macbr. 3-8 dm. tall, branching; leaflets oblong to narrowly linear, entire or 2-3-cleft; rays yellow or brown-purple. (*Ratibida* D. Don; *L. columnaris* T. & G.)—Nat. from the western prairies, in the Calumet District. May-June.

21. HELIANTHUS L. Sunflower

Coarse plants with medium-sized or large solitary heads, these many-flowered; both ray and disk flowers present, the rays yellow; involucre hemispheric or saucer-shaped, of numerous, leafy, often large bracts; receptacle flat or low-convex, very chaffy, the chaff embracing the fruit; pappus of 2 thin chaffy scales on the principal angles of the ovary, very deciduous; achenes compressed, smooth or corrugated.

- Annuals with flat receptacles.
  - Disk 2.5 cm. broad or more.......... *H. annuus* 1.
  - Disk 1.5 cm. broad at most.......... *H. petiolaris* 2.
- Perennials with convex or low-conical receptacle.
  - Involucral bracts close, short, unequal, not leaf-like; leaves mostly opposite or 3-nerved.
    - Disk dark.......... *H. atrorubens* 3.
    - Disk yellow.
      - Leaves abruptly contracted into long hairy petioles... *H. occidentalis* 4.
      - Leaves gradually tapering into long winged petioles.. *H. illinoensis* 5.
  - Involucral bracts looser, elongated or leaf-like; disk yellow, though with dark anthers.
    - Leaves not 3-nerved.
      - Leaves all opposite.......... *H. mollis* 6.
      - Leaves, at least the upper, alternate.
        - Stem smooth and glaucous.......... *H. grosseserratus* 7.
        - Stem hairy or scabrous.
          - Leaves and bracts very rigid.......... *H. Maximiliani* 9.
          - Leaves not rigid, bracts only slightly so.......... *H. giganteus* 8.
    - Leaves 3-nerved, all or most of them opposite.
      - Heads very small (8 mm. broad); rays 5-8.......... *H. microcephalus* 10.
      - Heads larger; rays more than 10.
        - Leaves long-petiolate.......... *H. decapetalus* 14.
        - Leaves sessile or short-petiolate.
          - Stem bristly-hairy.......... *H. divaricatus* 11.
          - Stem nearly smooth below.
            - Bracts equalling the disk; leaves whitish beneath.......... *H. strumosus* 12.
            - Bracts much longer than the disk; leaves green on both sides.......... *H. tracheliifolius* 13.

1. **H. annuus** L. (*Common Sunflower.*) Often very tall, robust, rough plant with mostly alternate large leaves which are 3-nerved, serrate, ovate, or the lower heart-shaped; rays long, very numerous.—Common, showy, coarse garden plant, native of the western prairies, naturalized along fence-rows, railroad tracks, in vacant lots and in open sand around Michigan City, but rarely found on the true dunes and never native. Around Miller some forms are cultivated with

orange-red rays, in other garden forms one sees contorted rays, and "double" flowers, that is, with many rows of rays. Summer, autumn.

2. **H. petiolaris** Nutt. More slender, 0.2-3 m. tall, the leaves mostly alternate, 2.5-8 cm. long, chiefly entire, oblong- or ovate-lanceolate.—Native of the western prairies, nat. along railroad tracks of the Calumet District and eastward to the high dunes. Summer.

3. **H. atrorubens** L. Stem slender, rough-hairy, 1.5-2.5 m. tall, smooth and naked and forking above; leaves ovate or oval to oblong-lanceolate or the lowest heart-shaped, thinnish, 7-15 cm. long, serrate, abruptly contracted into a margined petiole; heads small, corymbed; rays 10-16.—In dry soil of the pine woods, Calumet District. Summer.

4. **H. occidentalis** Riddell. Somewhat hairy; stem slender, simple, naked above, 1 m. high or less, sending out basal runners; lowest leaves lanceolate-ovate or oval, entire or obscurely serrate.—Sandy ridges and dunes, general west of Dune Park. Summer.

5. **H. illinoensis** Gleason. Similar, but the lower parts of the stem and the petioles loosely villous; leaves ovate to lanceolate, oblong, the pairs distant and few.—One of the most characteristic plants of the dunes and sandy oak woods throughout. Summer.

6. **H. mollis** Lam. Stem about 1 m. tall, leafy to the top, simple; leaves lanceolate or ovate, pointed, the base broadly clasping, a soft pubescence covering both surfaces.—In dry oak and pine barrens, and also behaving as a railroad weed. Summer.

7. **H. grosseserratus** Martens. 2-3 m. tall; leaves ovate-lanceolate, taper-pointed, coarsely toothed, petioled, often finely white-pubescent beneath.—In sand, Clarke and eastward through the high dune country. Summer. Often intergrading with the following.

8. **H. giganteus** L. Stem 0.5-3 m. tall, branched above; leaves lanceolate, pointed, minutely serrate or nearly entire, green both sides, nearly sessile but narrowed and ciliate at the base; bracts long, pointed, linear-lanceolate, hairy or strongly ciliate; rays pale yellow, 15-20.—In low moist woods, Clarke and eastward to the high dune country where it is often found in arbor-vitae bogs, in company with *Cirsium muticum*. Summer. A variable plant of which one strongly marked variety from our region is the endemic:

Var. **microcephalus** Peattie. Leaves very narrow, 1-1.2 cm. broad, very sparingly repand-dentate or entire; lower surface paler below and only slightly scabrous; stem slender and sparsely hairy; heads much smaller, on slenderer peduncles, the bracts less ciliate, narrower and shorter, as are the rays.—In wet ground, Clarke, and perhaps elsewhere.

9. **H. Maximiliani** Schrad. Similar to the preceding species, stout, 0.5-3 m. tall, often simple; leaves very scabrous, entire or denticulate; heads large, short-peduncled, in the upper axils, or terminal.—Nat. from the western prairies, in the Calumet District. Summer.

10. **H. microcephalus** T. & G. 1-2 m. tall, slenderly bushy-branched above; leaves ovate-lanceolate, thin, serrate, petioled, taper-pointed, rough above, pale or puberulent below; peduncles rough, slender.—Sandy thickets, Dune Park. Summer.

11. **H. divaricatus** L. Stem 0.5-2 m. tall, simple or corymbed at the top; leaves divaricate, all opposite, oval-lanceolate, tapering gradually to a sharp point, at base sessile and rounded or truncate, thick, rough on both sides; rays 8-12, and 2.5 cm. long.—A rather handsome species, one of the commonest plants of the oak dunes and ridges, throughout. Summer. Mrs. Chase reports from our area double-rayed heads.

12. **H. strumosus** L. Stem 1-2 m. tall, often glaucous below; leaves ovate-lanceolate, tapering to a tip, at base abruptly contracted into a winged petiole; upper surfaces rough, lower whitish and often minutely downy; rays with spreading tips.—In low sandy ground, Dune Park and East Chicago. Summer.

Var. mollis T. & G. Leaves downy beneath, somewhat heart-shaped; bracts more alternate, loose.—Dune Park.

13. **H. tracheliifolius** Mill. Similar to the preceding; with thinner, more sharply serrate, distinctly petioled leaves.—Dry sandy woods and ridges of the Calumet District. Summer.

14. **H. decapetalus** L. Stem branching, 0.5-1.5 m. tall, smooth below; leaves rough or smooth, pointed, ovate, abruptly contracted into a margined petiole; rays about 10.—In sandy fields, chiefly back of the high dunes. Summer.

22. **COREOPSIS** L. Coreopsis. Tickseed

Our species showy, with alternate leaves and showy ray flowers in addition to disk flowers; heads many-flowered; involucre hemispheric, of 2 series of bracts, the inner broad and appressed, the outer narrower, larger, spreading; receptacle flat; chaff thin, deciduous with the fruit; pappus none or more often consisting of 2 short barbless teeth upon the flat, winged achene.

Rays palmately lobed.	
Leaves all entire	*C. lanceolata* 1.
Upper leaves 3-parted	*C. grandiflora* 2.
Rays entire or merely toothed.	
Leaves 3-cleft, but not to the base	*C. palmata* 3.
Leaves pinnately 3-5-divided	*C. tripteris* 4.

1. **C. lanceolata** L. 3-6 dm. tall, branched at base or tufted, smooth or hairy; lower leaves petiolate, rarely with a pair of small lateral lobes, generally all entire, lanceolate or spatulate; heads showy; achenes broadly winged, roundish.—An elegant and common species, in sandy prairies and on the dunes, throughout. May-July.

2. **C. grandiflora** Hogg. Somewhat similar to the preceding, smooth; lower leaves spatulate, lanceolate, entire, the upper, besides

being 3-parted, are sometimes divided again into 2-3-parted lobes; heads larger.—In our area this handsome plant is a railroad weed, nat. from Great Plains. May-July.

3. **C. palmata** Nutt. Low, simple, nearly smooth; leaves opposite, sessile, appearing as if whorled; leaflets broadly wedge-shaped, rigid, the middle one 3-lobed; outer bracts narrow, about the length of the inner, all more or less united at the base; rays acute; pappus 2-toothed or none; achenes oblong, nearly straight, practically wingless.—A pretty little plant, found on moist prairies of the Calumet District. Also on inland dunes in the big dune country. July.

4. **C. tripteris** L. 1-2.7 m. tall, smooth; stem simple; leaves petiolate; leaflets acute, lanceolate; heads when bruised giving off scent of anise; disks turning brownish; outer bracts narrow, shorter, all united at the base; pappus none; achenes as in the preceding.—A coarse but handsome plant, found in sandy fields throughout. August, September.

23. BIDENS L. Beggar-ticks

Text contributed by Dr. Norman C. Fassett

Ray flowers none, or 3-8. Closely similar to *Coreopsis* except that the achenes are sometimes 4-angled or nearly cylindrical, with the teeth barbed at least at the apex. Usually less conspicuous in flower (except *B. coronata*) than *Coreopsis*, many frequenting aquatic situations; notable for tight-sticking fruits. Our species are annuals or biennials.

KEY TO FLOWERING SPECIMENS

- Rays conspicuous.
  - Lower leaves pinnately divided.
    - Peduncles glabrous.................................. *B. coronata* 7.
    - Peduncles pubescent.................................. *B. aristosa* 8.
  - Leaves all simple.
    - Rooting base up to 6 dm. long; stems smooth; chaff reddish-tipped; rays 1.5-3 cm. long................ *B. laevis* 1.
    - Rooting base rarely 1 dm. long; stem usually somewhat hispid; chaff yellowish-tipped; rays at most 1.7 cm. long.................................. *B. cernua* 2.
- Rays inconspicuous or wanting.
  - Leaves simple, or, if deeply cleft, the terminal division not stalked.
    - Leaves sessile or connate........................... *B. cernua* 2.
    - Leaves petioled.
      - Outer involucral bracts seldom reaching 1.5 the length of the disk; disk-flowers dark yellow or orange. *B. connata* 3.
      - Outer involucral bracts 2-5 times the length of the disk; disk-flowers light yellow................ *B. comosa* 4.
  - Leaves pinnate, the terminal division stalked.
    - Outer involucral bracts smooth or nearly so .... *B. discoidea* 5.
    - Outer involucral bracts regularly and copiously ciliate. *B. frondosa* 6.

KEY TO FRUITING SPECIMENS

- Achenes cuneate, without winged margins.
  - Leaves simple, or, if deeply cleft, the terminal division not stalked.
    - Heads nodding in anthesis; summit of achenes convex and cartilaginous.
      - Achenes straight and flat, not winged nor strongly keeled, deep brown or purplish.............. *B. laevis* 1.
      - Achenes curved, with almost wing-like pale margins and keels, olivaceous....................... *B. cernua* 2.
    - Heads erect in anthesis; summit of achenes not convex nor cartilaginous.
      - Achenes 4-angled at summit, upwardly barbed at very base and on the face....................... *B. connata* 3.
      - Achenes flat, downwardly barbed for their entire length. *B. comosa* 4.
  - Leaves pinnate, the terminal division stalked.
    - Outer bracts much exceeding the disk.
      - Outer involucral bracts smooth or nearly so .... *B. discoidea* 5.
      - Outer involucral bracts regularly and copiously ciliate. *B. frondosa* 6.
    - Outer bracts shorter than the disk.................. *B. coronata* 7.
- Achenes elliptic-ovate, with scarious crenate margins....... *B. aristosa* 8.

1. **B. laevis** (L.) BSP. Rooting along the decumbent base; leaves lanceolate, tapering at both ends, rarely connate; outer involucral bracts about equalling the disk, lanceolate, somewhat ciliate; disk broad, hemispherical; rays conspicuous; achenes 6-9 mm. long, retrorsely barbed on the margins, striate, with 2, 3, or 4 retrorsely barbed awns.—Frequent in shoal water of the Calumet District.

2. **B. cernua** L. Stems erect, often with spreading or arcuate branches near the base; leaves lanceolate, long-attenuate at tip; outer involucral bracts equalling or slightly exceeding the disk, smoother than in the preceding; disk broad, hemispherical; achenes 5-6 mm. long, striate, retrorsely barbed on the margins, with 4 retrorsely barbed awns.—Common and a nuisance in ditches, creeks, and sloughs.

3. **B. connata** Muhl. Erect, subsimple or much branched, often bearing short lateral branches terminated by single heads; leaves (in var. **typica** Fassett) on winged petioles and usually 3-parted, or (var. **petiolata** [Nutt.] Farw.) lanceolate, somewhat long-attenuate at tip, on slender petioles, not connate; heads campanulate; outer involucral bracts smooth-margined or ciliate at base; achenes 4-angled at summit, striate, often pubescent and tuberculate, retrorsely barbed on the margins except at the base; awns 4, rarely more, retrorsely barbed. —Swamps, common throughout.

4. **B. comosa** (Gray) Wiegand. Stout, with much the habit of the preceding; leaves coarsely toothed, spreading, with winged petioles; heads large and rather coarse; outer involucral bracts 1.5-4 cm. long, smooth-margined or slightly ciliate at base; achenes about 1 cm. long, light brown to olive, somewhat striate; awns ¾ as long as the achene.—Dune swales, throughout.

5. **B. discoidea** (T. & G.) Britton. Much branched; leaves as in the following but more slender; achenes small, upwardly barbed on surface, margins and awns.—"Edge of wet subdunal woods, Baileytown, not common" (Lyon).

6. **B. frondosa** L. Leaves pinnately 3-foliolate, rarely 5-foliolate, the segments sharply serrate, ovate to lanceolate, somewhat attenuate, the terminal one stalked in mature plants; outer involucral bracts linear to lanceolate; achenes flat, not striate, somewhat pubescent, upwardly barbed along the margins; awns 2, retrorsely barbed.—Pine and eastward through high dunes.

7. **B. coronata** (L.) Britton. Smooth; leaves pinnately 3-7-divided, the segments linear to lanceolate, serrate or sometimes entire; outer involucral bracts about 8, linear to spatulate, shorter than or slightly exceeding the disk, smooth or somewhat ciliate; inner achenes 5-7 mm. long, cuneate, upwardly ciliate on the margins; awns 2, upwardly barbed, sharply 3-angled, 1-5 mm. long, or shorter and appearing as erect stout teeth of the same texture as the body of the achene and appearing like continuations of it. (*B. trichosperma* Britton; not *B. coronata* Fisher.)—Common throughout the dune country, forming swales acres in extent, and a magnificent sight at flowering time. The form with narrowly linear leaf-segments is sometimes separated as var. **tenuiloba** (Gray) Britton. Late summer and autumn.

8. **B. aristosa** (Michx.) Britton. Somewhat pubescent; outer bracts 8-10, smooth-margined or somewhat ciliate; achene with 2 slender awns as long as the achene or reduced to short teeth.—Marshes and low grounds, common with the preceding. Late summer and autumn.

24. MEGALODONTA Greene. Water Marigold

Smooth aquatic perennial with crowded leaves, these many times dissected into capillary segments; achenes roundish, truncate at both ends, with 3-6 very long awns. Otherwise as in *Bidens*.

1. **M. Beckii** (Torr.) Greene. Immersed leaves crowded, the few emerging from water lanceolate, toothed; heads single, showy, short-peduncled; involucre much shorter than the golden rays; achenes thickish, smooth, the stout divergent awns barbed only at the apex. (*Bidens* Torr.)—A rare and beautiful species found in shallow water, East Chicago to Miller. The leaves are apt to be mistaken for those of a water buttercup or bladderwort. August-October.

25. GALINSOGA Cav.

Our species weedy low annuals with opposite leaves and very small heads of few flowers each; disk yellow, the inconspicuous rays white, only 4-5 in number; involucre small. of 4-5 thin bracts; receptacle conical, very chaffy; pappus none or of chaffy scales; achenes flat, angled.

1. **G. parviflora** Cav. Low; pubescence subappressed; leaves ovate, crenate-serrate, petioled; heads few, very small; rays white.— Roadsides and city streets; a tropical American weed. Summer.

26. HELENIUM L. Sneezeweed

Our species perennials with corymbed heads, the yellow rays drooping, 3-cleft at the apex, and with prominent yellow disks; involucre small, the bracts linear, reflexed; receptacle globose, naked; pappus of 5-8 thin chaffy scales of which the nerves are produced into a short bristle; achenes ribbed, top-shaped.

Plants pervaded with resinous dots and a volatile oil irritating to the nose; leaves alternate; rays several.

Upper leaves entire; heads less than 2 cm. broad; disk brownish	*H. nudiflorum* 1.
Upper leaves toothed; heads 2 cm. broad or more; disk yellow	*H. autumnale* 2.

1. **H. nudiflorum** Nutt. 3-9 dm. tall, somewhat puberulent; leaves linear to oblong or basal ones spatulate and dentate; rays yellow or brown purple.—In alluvial ground, Miller. June-August. Hybridizes with the following.

2. **H. autumnale** L. 0.2-2 m. tall, nearly smooth; leaves linear, narrowly lanceolate or ovate-oblong; heads 2-4 cm. broad, the truncate, drooping rays yellow.—Along the banks of the Grand Calumet, Deep River, Dune Creek, etc. August-October. Medicinally used.

27. ACHILLEA L. Milfoil

Strong-scented perennials with alternate leaves, in our species these bipinnately parted; rays white or pink, disk yellow, the rays few, the heads many-flowered, in corymbs; involucres bell-shaped; bracts with thin papery margins overlapping in a few rows, the outer shorter; receptacle flat and chaffy; pappus none; achenes flattened and winged.

1. **A. Millefolium** L. (*Yarrow.*) Stem 3-10 dm. tall, cobwebby or nearly smooth; stem leaves numerous, the divisions narrow; corymbs compound, flat-topped, 6-20 cm. broad, stiff; rays small, white to pink or crimson, less than one-half as long as the cylindric slender involucre.—One of the commonest plants of the high dunes; it also occurs as a common weed in waste places and around towns. The whole plant is pervaded by a chrysanthemum odor.

28. ANTHEMIS L. Chamomile

Plants with alternate, finely dissected leaves resembling those of *Achillea* (yarrow) and solitary terminal heads with numerous white rays and yellow disk flowers; involucre hemispheric, of numerous small papery bracts; receptacle conical, more or less chaffy; pappus none or a minute crown; achene truncate. Often strong-scented herbs.

Annual, ill-scented; chaff of the receptacle sharp-pointed	*A. Cotula* 1.
Perennial, pleasantly scented; chaff of the receptacle blunt	*A. nobilis* 2.

1. **A. Cotula** L. (*Dog Fennel, May Weed.*) Low; leaves finely 3-pinnately dissected; heads numerous, small but rather conspicuous.—A barnyard weed, most noxious on account of its odor; also around towns. Summer. Nat. from Eu.

2. **A. nobilis** L. (*Garden Chamomile.*) Tall, downy, with depressed, creeping, sterile shoots; leaves very finely dissected.—A beautiful European plant escaped from gardens and nat. in the Calumet District. Summer.

29. CHRYSANTHEMUM L. Ox-eye Daisy

Annual or perennial plants with toothed or pinnatifid leaves and medium or large heads, the disk yellow, the rays white or yellow; disk and ray flowers both numerous; involucre broad and low; scales overlapping in several rows, with papery margins; receptacle flat or low-convex, naked; pappus none or a scaly cup; achenes round or angled.

1. **C. Leucanthemum** L. var. **pinnatifidum** Lecoq & Lamotte. (*Common Daisy.*) Basal leaves pinnatifid to merely coarsely and irregularly toothed; middle and upper leaves oblanceolate or narrowly oblong and conspicuously subpinnatifid at base; heads solitary, terminating long branches, the rays white, the disk golden, the involucral bracts narrow and margined with brown.—Well-known weed, nat. from Eu., rather pretty but a pest; in our area found chiefly around cities and farmyards. Summer.

30. TANACETUM L. Tansy

Strongly aromatic plants with corymbed heads, pinnately dissected leaves, and yellow flowers; ray flowers usually wanting, rarely obscurely present; disk flowers numerous; involucre depressed, hemispheric, or bell-shaped, with dry, appressed bracts in several series; receptacle convex, naked; pappus none or a short crown; achenes truncate or obtuse, 5-angled.

1. **T. vulgare** L. 0.5-1 m. tall, smooth; leaflets and wings of the petiole cut-toothed; corymbs dense.—A bitter-aromatic herb with an odor like marigolds and mustard, sometimes medicinally used as "tansy tea" but capable at times of producing very poisonous effects. In our area still rare but likely to become more common. It is known around Michigan City and towns of the Calumet District. Autumn.

31. ARTEMISIA L. Wormwood

Tall, weedy, aromatic herbs or shrubby plants with panicled racemes of tiny, nodding, yellow heads, our species with finely dissected leaves; disk flowers only present; heads few-flowered in our species; involucre dry, of few overlapping scales; pappus none; achenes ovoid. Pollinated by wind

Plants densely white-woolly.
  Leaves pinnatifid.................................... *A. kansana* 3.
  Leaves entire or deeply toothed but not pinnatifid ...... *A. gnaphalodes* 2.
Plants glabrous or silky but not white-woolly.
  Inflorescence crowded in a slender and glomerate leafy panicle.................................... *A. biennis* 4.

Inflorescence not crowded and glomerulate.
  Racemes long, strict, in a wand-like panicle........... *A. caudata* 1.
  Heads in a loose ample panicle, small................. *A. annua* 5.

1. **A. caudata** Michx. Biennial, 0.5-1.5 m. tall, smooth or silky, the leaves dissected, the upper pinnately, the lower 2-3-pinnately divided, the divisions thread-form, diverging; heads only 2-3 mm. broad.—The commonest species of our region, characteristic of beaches, dune crests, blow-outs and sandy wastes. Summer.

A. canadensis Michx., often reported from our area, does not occur here but is known from the northern shores of Lake Michigan.

2. **A. gnaphalodes** Nutt. (*White Sage.*) Perennial, 0.3-1.2 m. tall; leaves lanceolate, the upper entire, the lower sometimes toothed or cut-lobed, the upper surface sometimes smooth and green; heads in leafy slender panicles, small, bell-shaped. (*A. ludoviciana* Nutt. in part.)—Very rare in the Calumet region, close to the lake shore. Perhaps nat. from the West. Summer.

3. **A. kansana** Britton. Perennial; stem erect, much branched, the branches strict; leaves crowded, numerous, the lower pinnately divided into 3-7 narrowly linear, revolute-margined segments, greenish above, the upper leaves mostly narrowly linear and entire; heads oblong-oval, sessile or very short-peduncled, erect or somewhat spreading, all in a dense narrow panicle.—Nat. from the West, along railway tracks of the Calumet District. Summer.

4. **A. biennis** Willd. Tall, strict perennial, glabrous, with lower leaves pinnately 2-parted, the upper pinnatifid, the lobes acute, linear, often cut-toothed; heads in small clusters or spikes in the panicles.—Occasional in sandy wastes throughout. Summer.

5. **A. annua** L. Much branched, the leaves 2-pinnately parted, with deeply pinnatifid oblong segments; heads small, drooping.—A very sweet-scented, weedy waif of the Old World, nat. around cities of the Calumet District and along railway lines. Summer.

A. longifolia Nutt., similar to *A. gnaphalodes* but the heads subcylindric, has been reported as a railroad waif, adv. from Great Plains, but seems not to have been seen for over thirty years.

32. ERECHTITES Raf. Fireweed

Coarse, bad-smelling annuals with paniculate-corymbed heads of inconspicuous white flowers and simple, alternate leaves; flowers all tubular, numerous; involucre long-cylindric, of a single row of linear bracts, with a few small bractlets at the base; receptacle naked; pappus of abundant soft white hairs.

1. **E. hieracifolia** (L.) Raf. Stem 0.3-3 m. tall, grooved, often hairy; leaves sessile or petioled, the upper auricled at base, oblong or lanceolate, acute, cut-toothed; pappus bright white.—In swales, meadows, and thickets, especially in burned-over ground. Both in the high dune country and Calumet District. Summer.

33. CACALIA L. Indian Plantain

Smooth and tall perennial plants with alternate, often petioled leaves and corymbose, rather large, creamy or white heads; flowers all tubular, few or many; involucres cylindric; bracts in one row, with a few small bractlets at the base; receptacle naked; pappus of copious soft hairs; achenes oblong, smooth.

Involucre 25-30-flowered, with several bractlets at its base.. *C. suaveolens* 1.

Involucre 5-bracted and 5-flowered, its basal bractlets none or minute.

Stem rounded; lower leaves triangular-kidney-shaped..... *C. atriplicifolia* 2.

Stem angled and grooved; lower leaves lance-oval or oval. *C. tuberosa* 3.

1. C. **suaveolens** L. Stem 1-1.5 m. tall, grooved; leaves halberd-shaped, triangular-lanceolate, serrate, pointed, those on the stem winged along the petiole. (*Synosma* Raf.)—An aromatic plant (at least in drying) in meadow land adjoining Trail Creek, Michigan City; rare. Also long ago reported near East Chicago. August, September.

2. C. **atriplicifolia** L. Stem 1-2 m. tall; plant glaucous; leaves angulate-lobed, palmately veined, the upper rhomboid or wedge-form, toothed. (*Mesadenia* Raf.)—A handsome plant on the prairies and wooded dunes. Summer.

3. C. **tuberosa** Nutt. Stem 6-20 dm. tall, from a tuberous root; leaves thick, strongly nerved, the upper on short margined petioles. (*Mesadenia* Britton.)—A beautiful aromatic plant of the prairies of the Calumet District. Summer.

34. SENECIO L. Groundsel

Annual or perennial, with alternate, often deeply pinnatifid leaves, these largely basal and often woolly or cobwebby especially when young; disk flowers numerous; rays (present in our species) several; involucre bell-shaped, with a single row of bracts; receptacle flat; pappus of copious soft bristles; achenes roundish or ribbed, when wet becoming minutely warty and emitting a pair of spiral threads; heads small, corymbose or solitary, bright golden yellow.

Leaves permanently woolly............................ *S. plattensis* 3.

Leaves soon smooth.

Lower leaves subrotund to lanceolate; earliest leaves cordate or subcordate, usually long-petioled: leafy shoots short and stout and ascending at the tip.... *S. aureus* 1.

Lower leaves oblong-lanceolate to spatulate, usually narrowed gradually to the base; earliest leaves rarely subrotund or oblong.......................... *S. Balsamitae* 2.

1. S. **aureus** L. Rootstocks slender; stems 3-8 dm. tall, at first slightly woolly, finally smooth; lower leaves long-petioled, crenate-dentate, stem leaves laciniate-pinnatifid or lyrate, the uppermost bract-like; inflorescence a cymose corymb.—A rather handsome plant of the prairies and dune meadows. Spring.

2. **S. Balsamitae** Muhl. Stems 1.5-3 dm. tall, more or less woolly at base, smooth above; lower leaves mostly oblong-lanceolate, gradually narrowed to a slender petiole, sharply toothed or crenate; upper leaves lyrate, pinnatifid, or entire and small.—Prairies and thickets of the Calumet District. Summer.

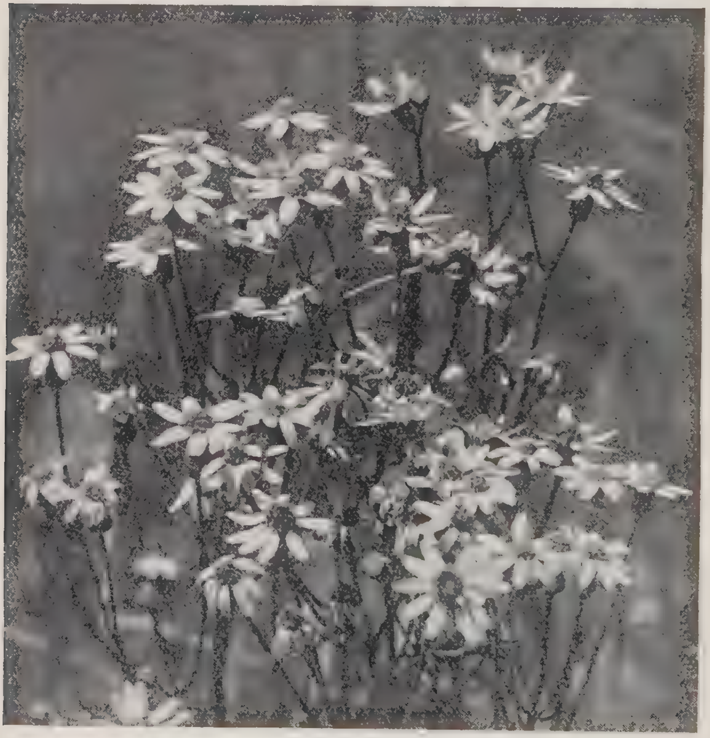


FIG. 38. GROUNDSEL (*Senecio aureus*)

Var. **pauperculus** (Michx.) Fernald. Similar, but dwarfed, commonly not over 3 cm. tall, and with the inflorescence reduced, sometimes to a single head.—Exposed sands, Pine; rare. Summer.

3. **S. plattensis** Nutt. 1.5-6 dm. tall; lower leaves thickish, irregularly pinnatifid to crenate-dentate, ovate to oblong-lanceolate, petiolate; inflorescence a corymbose cyme; heads about 1 cm. high; achenes hispidulous.—Open wooded dunes, not infrequent. Spring and early summer.

35. ARCTIUM L. Burdock

Coarse biennial weedy plants with large cordate leaves and clustered or solitary heads and purple or pale lilac flowers; flowers all tubular; involucre globular, composed of thick bracts with long spiny tips, forming a bur-like head; receptacle flat, densely bristly; pappus of short rough bristles; achenes wrinkled cross-wise, oblong, flattened.

1. **A. minus** Bernh. Low; basal leaves large, on hollow petioles, with wavy margins, paler and tomentose below; involucre sometimes covered with a minute cobwebby pubescence; heads 2.5-3.5 cm. broad, subracemose; bracts exceeding the corollas. (*A. remorsum* Lejeune; *Lappa minor* Hill.)—Common about farms and cities. August, September. Weed nat. from Eu.

36. CIRSIUM Hill. Thistle

Coarse biennials or perennials with large terminal heads of purple, yellow, or white flowers, and alternate, often prickly and pinnatifid leaves; flowers all tubular, numerous; involucre spherical, the numerous overlapping bracts sometimes terminating in a prickly point; receptacle bristly; pappus plumose to the middle, the numerous hairs united into a ring at the base; achenes flat, smooth.

Leaves densely woolly on both sides; flowers creamy or yellowish . . . . *C. Pitcheri* 3.
Leaves in maturity not densely woolly, or only underneath; flowers purple or rarely white.
  Leaves densely woolly beneath.
    Bracts of the involucre not or scarcely bristly-pointed; heads small, numerous; none of the leaves strongly decurrent . . . . *C. arvense* 2.
    Bracts of the involucre, at least some of them, sharply prickly; heads large, mostly solitary at the ends of branches; leaves strongly decurrent on the stem.
      All bracts of the involucre tipped with prickles . . . . . . *C. lanceolatum* 1.
      Only the inner bracts bristle-tipped, the outer merely acuminate.
        Leaves deeply lobed or pinnatifid . . . . *C. discolor* 4.
        Leaves, at least the upper, undivided, though strongly bristly-dentate . . . . *C. altissimum* 5.
  Leaves at maturity not or scarcely woolly on either side.
    Heads small (not over 2.5 cm. high), numerous . . . . *C. arvense* 2.
    Heads large (3-5 cm. tall), mostly solitary at the ends of branches
      Stem low, stout, 3-9 dm. tall; heads 4-8 cm., across. . . *C. pumilum* 7.
      Stem tall (1-2.5 m.); heads about 3 cm. across. . . . . . . *C. muticum* 6.

1. **C. lanceolatum** (L.) Hill. (*Common Thistle.*) Tall coarse species with leaves decurrent on the stem, forming prickly wings, pinnatifid, prickly, rough and bristly above, white-woolly beneath with deciduous hairs; flowers purple. (*Carduus* L.; *Cnicus* Willd.)—Handsome European weed, a great pest; occasional in richer soil around farms and towns. July-November.

2. **C. arvense** (L.) Scop. (*Canada Thistle.*) Slender perennial, 3-9 dm. tall from a wide-creeping rootstock; leaves lanceolate or oblong, not strongly decurrent, smooth or slightly woolly beneath, margins sinuate-pinnatifid and very prickly; flowers rose-purple or whitish. (*Carduus* Rob.; *Cnicus* Hoffm.)—Handsome but harmful European weed, frequent around towns and farms. Summer.

3. **C. Pitcheri** (Torr.) T. & G. (*Yellow Beach Thistle.*) Stem low, very leafy; plant white-woolly throughout; leaves all pinnately parted into very narrow rigid divisions, these sometimes again pinnatifid, the margins revolute; heads mostly solitary; flowers pale yellow. (*Carduus* Porter; *Cnicus* Torr.)—On the beaches of Lake Michigan; a curious and handsome endemic of the Great Lakes Region. Summer.

C. undulatum (L.) Hill has often been reported from our region, usually under the generic names of *Cnicus* or *Carduus*, but this is probably erroneous. The plant meant by older writers on the dunes was probably *C. pumilum*, which was then not well understood.

4. **C. discolor** (Muhl.) Spreng. (*Field Thistle.*) 1-2 m. tall, branching, perennial; stem somewhat hirsute, strongly furrowed; basal leaves 3-4 dm. long, deeply pinnatifid, the lobes often cleft; heads solitary at the ends of the branches; flowers purple. (*Cnicus* Muhl.; *Carduus* Nutt.)—Prairies, thickets and dune meadows. Summer.

5. **C. altissimum** (L.) Spreng. Stem 1-4 m. tall, branching, downy; leaves oblong-ovate to lanceolate, sinuate, hairy above and weakly prickly; outer bracts tipped with a strong spreading prickle, inner not prickly. Flowers chiefly purple. (*Carduus* L., *Cnicus* Willd.)—Infrequent in dune woods, especially the lower and richer ones. Summer.

6. **C. muticum** Michx. (*Swamp Thistle.*) Stem 1.3-5 m. tall, angled, panicled at the summit; leaves somewhat cobwebby and white-hairy beneath when young, margins deeply pinnatifid with narrow cut-lobed divisions, prickly-pointed; involucre webby and sticky; flowers purple. (*Carduus* Pers.; *Cnicus* Pursh.)—A handsome but formidable plant, often very large, growing in arbor-vitae bogs and along sloughs. Also dune meadows. Summer.

7. **C. pumilum** (Nutt.) Spreng. (*Bull* or *Pasture Thistle.*) Leaves pinnatifid, with lobes short and very prickly-dentate, oblong-lanceolate, hairy, partly clasping, often forming an involucral whorl under the heads; outer bracts prickly-pointed, inner very slender; flowers purple or white, fragrant. (*Cnicus odoratus* Muhl.; *Cnicus Hillii* Canby; *Cirsium Hillii* Fernald.)—Fields, prairies, meadows and dunes, throughout. Summer and autumn.

37. CENTAUREA L. Star Thistle

Plants with alternate, often pinnatifid leaves, these sometimes subspiny as are the bracts of the involucre; heads solitary, blue, white, rose-purple or yellow, many-flowered; flowers all tubular, those of the margin often sterile and enlarged, thus appearing falsely radiate; involucre globose, the bracts numerous, margined or appendaged; receptacle bristly; pappus bristly, partly chaffy, or none; achenes 4-angled or flattened.

Some of the bracts with regularly toothed margins or tips... *C. Cyanus* 1.
Bracts entire or merely irregularly small-toothed on the margins.
  Leaves slightly denticulate.......................... *C. Jacea* 2.
  Leaves pinnatifid.................................... *C. moschata* 3.

1. **C. Cyanus** L. (*Corn-flower, Bachelor's Button, Bluebottle.*) Heads solitary, the flowers blue or rarely violet, pink, or white. (*C. arvensis* Moench; *Cyanus Cyanus* Hill.) — A garden plant which is sometimes established around cities in waste ground. Intr. from Eu. Summer.

2. **C. Jacea** L. (*Star Thistle.*) Corollas rose-purple; heads showy. (*Cyanus* Gaertn.)—A garden plant of European origin, found in the urban regions of the Calumet District as a rare escape.

3. **C. moschata** L. (*Sweet Sultan.*) Lobes of the leaves dentate; innermost of the involucral scales with scarious margins; flowers white, yellow, or purple, fragrant.—Intr. from Asia, cult., and nat. around Mineral Springs. Summer.

38. TRAGOPOGON L. Goatsbeard

Stout glabrous biennials or perennials with slender fleshy tap roots and entire, grass-like, clasping leaves and yellow or purplish flowers in solitary heads which are many-flowered; flowers all ligulate; involucre of several erect, narrowed, lanceolate, equal bracts; pappus bristles in 1 series, plumose, connate at base, the plume branches interwebbed; achenes linear, 3-5-angled and 5-10-ribbed.

1. **T. pratensis** L. Stem 1 m. or less high; flowers yellow, generally closing before noon.—A weed of European origin appearing both in flower and fruit like a large dandelion. Recently established in great numbers around Chicago, but in our area noted at present only in the extreme southwest corner, on prairie roadsides around Dyer. It will probably soon become more prevalent. June, July.

39. CICHORIUM L. Chicory

Perennials with solitary axillary or terminal heads of flowers and mainly basal leaves, the small stem leaves alternate; flowers blue, white or pink, all ligulate, the rays truncate at the apex, numerous; involucre of 2 rows, the outer of 5 spreading, short bracts, the inner of 8-10 erect bracts which partially enclose the fruit; receptacle flat and naked; pappus of short blunt scales in 2-3 series; achenes truncate, 5-angled.

1. **C. Intybus** L. Root deep, perennial; stem straggling; leaves few, narrow, partly clasping, the lowest sharply incised with the segments directed backward, those of the rigid flowering stems very small; heads blue or white or pink, generally closing in the afternoon.—Garden and crop plant, intr. from Eu. and recently becoming abundant around Chicago. As yet it is rare in our area, around cities and farmyards. Summer.

40. KRIGIA Schreb. Dwarf Dandelion. Cynthia

Low herbs with lyrate or pinnatifid, chiefly basal leaves and small, solitary, yellow or orange heads; flowers all ligulate, few to many; involucre bell-shaped, its bracts numerous, thin, in 2 series; pappus of an outer fringe of chaffy scales, the inner row of delicate bristles; achenes truncate. Resembling dandelions.

Pappus of 10-15 small oblong scales and 15-20 bristles.......	*K. biflora* 1.
Pappus of 6-7 short roundish scales and as many alternating bristles..	*K. virginica* 2.

1. **K. biflora** (Walt.) Blake. Stem 1-6 dm. tall; stem leaves only 3, at most clasping, entire, oblong or oval; radical leaves on short winged petioles, toothed or pinnatifid; peduncles 2-5 in number; heads about 3.5 cm. broad. (*K. amplexicaulis* Nutt.; *Cynthia amplexicaulis* Beck; *C. virginica* D. Don; *Adopogon virginicum* Shafer.)—Moist sand or thickets, throughout. Summer.

2. **K. virginica** (L.) Willd. 3 dm. tall or less, annual; stems several, branching, leafy; leaves at first roundish and entire, the later ones narrow, pinnatifid; peduncles several, 2.5-4.5 cm. tall; heads 6-16 mm. broad. (*K. caroliniana* Nutt., *Cynthia virginica* Beck; *Adopogon carolinianum* Britton.)—In sandy ground, throughout. Spring and summer.

41. TARAXACUM Ludwig. Dandelion

Perennial or biennial low herbs with hollow stems and only basal, lyrate or pinnatifid leaves, and solitary yellow heads; flowers all ligulate, numerous; involucre cylindrical, the short outer bracts mostly recurved, the long inner ones erect; pappus of numerous white soft hairs; achenes long, 4-5-ribbed, tipped with a slender beak.

Heads 3-5 cm. broad, orange yellow; achene greenish or brownish......................................	*T. officinale* 1.
Heads 2-3 cm. broad, sulphur yellow; achene bright red.....	*T. laevigatum* 2.

1. **T. officinale** Weber. (*Common Dandelion.*) Leaves coarsely pinnatifid, sinuate-dentate or rarely entire, the terminal lobe generally large; bracts of the involucre not glaucous, the outer enlarged and recurving; peduncles 5-45 cm. tall; heads large, 150-200-flowered, light golden yellow; pappus silvery; achenes brown. (*T. Taraxacum* Karst.; *T. Dens-leonis* Desf.; *Leontodon Taraxacum* L.)— Common weed of European origin, in cultivated and waste grounds, also sometimes even in marshy ground among native plants. Spring to autumn.

2. **T. laevigatum** (Willd.) DC. (*Red-seeded Dandelion.*) Leaves narrowly pinnately divided or deeply cut, the lobes reflexed; involucral bracts glaucous, the outer short and not recurved; heads small, 70-90-flowered, sulphur yellow; pappus dirty white; achenes reddish. (*T. erythrospermum* Andrz.; *Leontodon erythrospermum* Britton.)—A weed only recently nat. from Europe; it has been noted at Clarke and Tremont and will doubtless spread. May, June.

42. SONCHUS L. Sow Thistle

Smooth and glaucous, rather succulent weeds with mostly clasping, rather prickly stem leaves and corymbs or umbels of yellow heads; flowers all ligulate; pappus copious, of soft white hairs; achenes flattened, furrowed, not beaked.

Perennial with creeping rootstocks; flowers bright yellow, in large heads.................................... *S. arvensis* 1.
Annuals with pale yellow flowers.
  Leaves slightly spiny-toothed; achene wrinkled crosswise.. *S. oleraceus* 2.
  Leaves with conspicuous spiny teeth; achene not wrinkled but 3-nerved on each side....................... *S. asper* 3.

1. **S. arvensis** L. Leaves clasping, spiny, pinnatifid, with backward segments; the involucre and peduncles bristly; achenes cross-wrinkled on the ribs.—A bad weed from Europe, around towns and railroads. A specimen from Pine has a very meagre root and leaf system, a low and spindling stem, and smaller heads; this is perhaps a depauperate form due to growth in cinders or on stony ground. Summer.

2. **S. oleraceus** L. Stem leaves clasping, the basal auriculate, acute, pinnatifid with backward segments; achenes striate.—A weed, adv. from Eu. and established around cities of the Calumet District. Early summer.

3. **S. asper** (L.) Hill. Stem leaves less divided than in the preceding, the base clasping, the auricles rounded; achenes margined.—A weed, adv. from Eu. and established around cities of the Calumet District. Early summer.

43. LACTUCA L. Wild Lettuce

Tall, rather weedy, leafy-stemmed plants with entire, or lyrate or pinnatifid, sometimes prickly leaves and panicled heads of brightly colored flowers, these all ligulate, several or many; involucre cylindrical; bracts in 2 or more rows of unequal length; pappus of numerous silky hairs; achenes ending in a slender beak.

Pappus tawny....................................... *L. spicata* 4.
Pappus white.
  Stems prickly; flowers yellow......................... *L. scariola* 1.
  Stems not prickly.
    Flowers pale yellow............................... *L. canadensis* 2.
    Flowers blue...................................... *L. villosa* 3.

1. **L. scariola** L. (*Prickly Lettuce.*) Annual or biennial, slenderly upright, with the stem leaves sagittate-clasping, pinnatifid, spinulose-toothed, tending to turn with one edge upward (hence a "compass" plant), the midrib beset with bristles beneath; heads small, 6-12-flowered; achenes several-nerved, flat, with distinct soft beaks; flowers fading blue.—Occasional in waste ground. A European weed. Summer.

Var. **integrata** Gren. & Godr. Leaves denticulate, oblong, none of them pinnatifid; midrib prickly-setose or rarely smoothish. (*L. virosa* L.)—Very common in waste ground and along railroad tracks. Noxious European weed. Summer.

2. **L. canadensis** L. (*Tall Lettuce, Wild Opium.*) Tall glabrous and glaucous annual or biennial, very leafy, the leaves sinuate-pinnatifid or the upper entire, lower surface pale; heads numerous in a long open panicle, 12-20-flowered; achenes blackish, 1-nerved on each face. —Frequent in waste ground and fallow fields; not among high dunes.

3. **L. villosa** Jacq. (*Blue Sailors.*) Tall biennial with ovate to oblong-lanceolate pointed leaves which are sharply and doubly serrate, or deeply lobed with backward divisions, the lowest sometimes cleft to the base, the stem leaves arrow-shaped or halberd-shaped, the petiole winged; heads small, numerous, in a loose panicle; achenes beakless. —Rare in sandy woods of the Calumet District. Summer.

4. **L. spicata** (Lam.) Hitchc. Smoothish biennial 1-4 m. tall, leafy, the leaves coarsely toothed, irregularly pinnatifid, the upper sometimes heart-shaped-clasping at base; panicle large, dense, compound; flowers creamy or bluish; achene with a short beak.—Not infrequent in low grounds throughout. Summer.

44. PRENANTHES L. Rattlesnake-root

Perennials; leaves various, the small heads mostly nodding, dull-colored; flowers all ligulate, few or many; involucre cylindrical, of a few linear bracts in 1 row; pappus abundant, tawny or straw-colored, consisting of silky hairs; achenes short, grooved.

Stem leaves sessile	*P. racemosa* 1.
Stem leaves, some or all of them, petiolate.	
Pappus deep reddish brown	*P. alba* 3.
Pappus white, pale brown or straw-color.	
Involucre of 6-8 primary bracts, 8-12-flowered	*P. trifoliata* 2.
Involucre of 5 primary bracts, beside minor ones, 5-6-flowered	*P. altissima* 4.

1. **P. racemosa** Michx. Stem 0.2-1.5 m. tall; leaves denticulate, oval or oblong-lanceolate, smooth and glaucous, the upper partly clasping; inflorescence strict, pubescent; heads purplish, 12-15-flowered, nearly erect, in crowded clusters. (*Nabalus* Hook.)—In sandy fields and prairies, frequent. August, September.

2. **P. trifoliata** (Cass.) Fernald. (*Gall-of-the-earth.*) Leaves nearly all petioled, thinnish, the lower 3-divided, sometimes uncleft or the divisions finely dissected; inflorescence a long panicle with clustered heads; involucre cylindrical at least below, glaucous, pale green or purple-tinged, the outer bracts lance-triangular, firmish, pale-margined, the longest of them 1.5-2.5 mm. long. (*Nabalus* Cass.)—In rich dune woods east of Michigan City, rare. Autumn.

3. **P. alba** L. Stem 0.5-1.5 m. tall, stout, usually purplish, the whole plant smooth and glaucous; leaves angulate or triangular-halberd-shaped, 3-5-cleft or sinuate-toothed, the upper oblong and un-

divided; involucre of 6-8 primary bracts, whitish green and purplish, glaucous; flowers 8-12 in a head, whitish; inflorescence racemose or paniculate, the heads pendulous. (*Nabalus* Hook.)—In sandy woods and fields, common. Late July to early October.

4. **P. altissima** L. Similar to the preceding, 1-2 m. tall, slender, smooth, with ovate, heart-shaped or triangular, cleft or toothed leaves or 3-5-parted, with the divisions sometimes again cleft; heads in small axillary and terminal loose clusters, forming a leafy wand-like panicle; involucre very slender, greenish; flowers greenish-white. (*Nabalus* Hook.)—In rich soil among thickets, occasional throughout.

45. HIERACIUM L. Hawkweed

Perennials with solitary or paniculate heads of yellow or orange flowers, the leaves various, often wholly basal, the whole plant usually hispid, hairy, or glandular; flowers all ligulate, few or many; involucre cylindric or bell-shaped, of 1-3 series of bracts; pappus of 1 row of delicate tawny bristles; achenes short and striate.

- Heads large, 2.5-4.5 cm. in diameter .... *H. canadense* 5.
- Heads small, 1-2.3 cm. in diameter.
  - Inflorescence slender and elongate, subcylindric, not leafy-bracted. .... *H. Gronovii* 3.
  - Inflorescence a corymbiform panicle (or rarely subcylindric but then leafy-bracted in No. 4).
    - Leaves all or chiefly basal.......................... *H. venosum* 1.
    - Stems leafy to the inflorescence.
      - Leaves glabrous, glaucous beneath .... *H. paniculatum* 2.
      - Leaves hairy on both surfaces .... *H. scabrum* 4.

1. **H. venosum** L. (*Rattlesnake Weed.*) Stem 2-7 dm. tall, smooth, slender, forking above into a loose corymb; leaves in a basal rosette, elliptical-oblong, glaucous beneath, above glabrous and usually purple-veined or mottled, nearly entire, scarcely petioled; pedicels very slender, slightly glandular near the top.—Once reported from Miller, Whiting, perhaps not now present. May-September.

2. **H. paniculatum** L. Stem 3-12 dm. tall, slender, villous at base, glabrous above; leaves thin, remotely toothed, lanceolate; panicle lax; heads small, on very slender pedicels, 12-20-flowered.—In black oak woods of the Calumet District. July-September.

3. **H. Gronovii** L. Stem 3-12 dm. tall, wand-like, leafy mostly below the middle, villous at the base; basal leaves obovate to oblong, 5-15 cm. long, rounded or obtuse, bristly on the upper surface and minutely stellate-pubescent beneath; stem leaves similar, but decreasing in size; panicle thyrsoid; pedicels slightly glandular; heads 15-20-flowered.—A common plant of the oak woods and dunes, throughout. August-October.

4. **H. scabrum** Michx. 3-12 dm. tall; stem stout and rough-hairy; leaves spatulate-obovate to elliptic, obtuse, thickish, subentire, paler beneath; panicle white-tomentose and black-glandular, stiff; pedicels

stoutish; heads 40-50-flowered.—In black oak woods of the Calumet District and in high dune country. July-September.

H. longipilum Torr., differing from the preceding in being covered with long soft white or tawny hairs, has been reported by Pepoon from our area, but no specimens have been seen.

5. **H. canadense** Michx. Stem 2-12 dm. tall, rather stout; basal leaves scarcely petioled, lance-oblong, the stem leaves numerous, coarsely toothed especially below the middle, firm in texture, acute, the upper, at least, rounded or subcordate at the base; heads several in a corymb.—Common and characteristic plant of the pine barrens and dry low sandy ridges of the Calumet District; occasionally found eastward among the dunes. July-September.

GLOSSARY

Achene. Small, dry, hard, 1-celled, 1-seeded, non-splitting fruit; often mistaken for a seed, the true seed being within. Achenes are often found in compound fruits, as the little yellow "straws" or "seeds" in strawberries.

Adnate. Grown together, applied especially to organs of unlike nature.

Adv. Adventive, imperfectly naturalized from some exotic flora.

Annuals. Plants of one year's duration; *Winter annual* from seed sown in autumn, blooming next spring.

Annular. In the form of rings, especially the annual layers of growth in woody Dicotyledones.

Anther. A pollen-bearing organ, generally consisting of two sacs or cells which open by slits or pores to permit escape of pollen. See *Stamen.*

Anthesis. The time of opening of a flower.

Apetalous. Without petals.

Appressed. Lying close against a branch or axis.

Areole. A small space marked out on a surface, as between network of veins on a leaf, the center generally occupied by a pore.

Aril. An appendage growing from a seed often appearing like a seed coat or like a whole fruit and frequently brightly colored or prominent.

Articulating, articulated. Jointed to an axis by an easily detachable node.

Asexual. Without sex. Particularly, reproduction by vegetative means, as bulblets, gemmae, buds, etc.

Assurgent. With the tips ascending.

Auricle. A lobe, especially the basal areas of heart-shaped, arrow-shaped or halberd-shaped leaves or stipules.

Awn. A bristle-like point or extension of a midnerve, especially of the floral envelopes of grasses.

Axil. Point of insertion of a leaf or bract with a branch, or of branches with a stem.

Axillary. In an axil.

Barbellate. Having minute stiff slender protuberances, as on the pappus of some *Compositae.*

Berry. A fleshy fruit having no hard part but the seeds; technically many fruits called "berries," such as strawberry, blackberry, etc., are not berries but compound fruits composed of drupelets. Blueberries and buckthorn berries are true berries. Juniper berries are merely berry-like, being only modified cones.

Biennial. Lasting two years, the first year forming vegetative shoots only, the second flowering.

Bract. A more or less modified leaf, generally subtending a flower, fruit, inflorescence or branch of an inflorescence, sometimes merely a much reduced stem-leaf. Bracts in the *Compositae* are closely overlapping or approximate leaves forming the calyx-like involucre of each head of flowers. The variable spathes of the Monocotyledones are also special sorts of bracts.

Bracteate. Bracted.

Bractlet. A secondary, generally also a smaller, bract.

Bulb. A subterranean, expanded portion of the stem, differentiated from corms and tubers in not being a solid whole but formed of the bases of leaves.

Bulblet. A small, aerial bulb, or more usually a bud, frequently replacing a flower and capable of dropping off and germinating asexually.

Calyx. The outer series of envelopes of a flower—generally green and leaf-like, but in the absence of petals often petal-like; "calyx" is most often applied when the individual sepals are united.

Campanulate. Bell-shaped.

Canescent. With hoary hairs.

Capillary. Hair-like, hair-thin.

Capitate. Shaped like a head. Headed; in heads; aggregated into a dense cluster.

Capsule. A dry fruit variously splitting at maturity. Only loosely differentiated from a pod, but generally a small thin-walled fruit.

Carpel. A single pistil or one pistil of a group.

Cartilaginous. Thick and tough.

Catkin. A spike (generally pendulous or recurved) of mostly unisexual, small, closely set flowers. A term used generally of the peculiar inflorescences of certain trees, as willow, poplar, hickory, walnut, oak, etc., having few or very reduced floral envelopes, the flowers being merely the sex organs with or without the rudiments of perianth or bracts, compacted on the spike.

Centrum. A central cavity, especially the internal air space in the hollow stems of *Equisetum.*

Cespitose. Growing in, or forming, tufts or clumps.

Chaff. Scales or husks, employed especially to denote the dry scales of the receptacles of flowers in certain *Compositae.*

Chartaceous. Papery in texture.

Chlorophyll. The green coloring matter of plants by which they manufacture food.

Cilia. Hairs on the margin of a leaf or sepal or other organ, or angle of a stem.

Ciliate. Having cilia.

Claw. A narrowed point of attachment, especially of a petal as contrasted with the broad blade.

Clawed. Having a claw.

Cleistogamous. Fertilized in the bud, without opening of the flower. Cleistogamous flowers are generally inconspicuous.

Coherent. Adhering.

Column. The 1 or 2 fertile stamens cohering with the style and situated at the base of the lip which form the essential, sex organs of the orchid flower. In *Asclepiadaceae,* the united stamens and stigmas. In the mallow family the united stamens.

Compound. Composed of single parts variously united into a whole, as a compound ovary or a compound leaf; that is, one divided into separate leaflets.

Cone. A dense and more or less conical collection of flowers or fruits. Loosely said of the heads of some *Compositae,* but usually used to denote the female inflorescence of *Pinaceae,* especially in fruiting condition. The cone of *Pinaceae* generally consists of the woody sporophylls and an axis; it is often modified, as in *Juniperus,* to a berry-like fruit. The spike of sporophylls in the *Lycopodiaceae* and *Equisetum* is cone-like, as is also the fruit of *Magnoliaceae.* The fruits of birch and especially alder are superifically similar to the cones of the pine family.

Confluent. Running together, as leaflets of a compound leaf, or fruit dots of ferns enlarging till they merge.

Cordate. Heart-shaped.

Corm. The enlarged base of a stem, resembling a bulb, but not solid.

Corolla. The inner series of envelopes around the sex organs of a flower, used especially where the individual petals are united, at least at base. The calyx, especially in the absence of a corolla, often assumes a corolla-like appearance.

Corona. A crown or appendages in or on the corolla, as in *Narcissus* or *Lychnis.*

Corymb. A raceme in which the stalks of the lateral flowers are elongated to bring all to one level, though arising from different points on the axis.

Corymbose. Disposed as in a corymb.

Cotyledon. The primary leaf from a seed to be seen in a developing seed, and arising as a first shoot. The cotyledon gives place to true leaves soon after sprouting of the seed.

Crenate. Having rounded teeth.

Culm. The peculiar stem of grasses and sedges.

Cult. Cultivation. Cultivated.

Cylindraceous. Of cylindrical form.

Cyme. A broad flattish inflorescence with its central or terminal flowers blooming first.

Cymose. Cyme-like, or bearing cymes.

Declined. Bent downward, or nodding.

Decompound. More than once divided.

Decumbent. Reclining, but with the summit ascending.

Decurrent. Extending down the stem, as of a leaf below its point of insertion.

Deflexed. Bent abruptly down.

Deltoid. Of triangular outline.

Dentate. Toothed, especially with the teeth directed backward.

Denticulate. Minutely-dentate.

Dichotomous. Forking regularly in pairs.

Diffuse. Widely or loosely spreading, divergent.

Digitate. Compound with the members (as leaflets of a leaf) arising together from a point, as the fingers of the hand.

Disc, disk. A more or less fleshy development of the receptacle of a flower around the ovary. In the *Compositae* the tubular flowers of the head, as distinct from the rays, often called "center" or "eye." Also used in connection with the surface of a stigma, or especially of united stigmas, as in *Asclepias.*

Dissected. Cut or divided into numerous segments, generally very narrow ones.

Dorsal. Upon or relating to the outer surface or "back" of an organ.

Drupe. A fleshy, 1-celled, 1-seeded fruit containing a "stone" which in turn contains the seed (as in cherries).

Ecological. Concerning the relation or adaptations of plants to environment.

Ellipsoid. The general shape of an ellipse.

Emersed. Raised above water.

Excurrent. Extending out beyond.

Exserted. Extended out beyond, used especially of stamens or styles surpassing the perianth.

Extrorse. Facing outward. Said of anthers turned from the center of the flower.

Falcate. Scythe-shaped, curved and flat.

Fascicle. A close bundle or cluster.

Fasciculate. In fascicles.

Fastigiate. Having closely clustered branches.

Fertile. Capable of producing fruit; or, a pollen-bearing anther, or anther-bearing stamen; or a spore-bearing frond of a pteridophyte. Sometimes used to denote flowers wholly female.

Filament. The supporting stalk of an anther, generally thread-form but often much modified.

Filiform. Very slender, like a thread.

Fistular, fistulous. Hollow and cylindrical.

Floret. A little flower, used especially of the small flowers comprised in the composite head of flowers in *Compositae*, also of the individual flowers in the grass spikelet.

Flower. A stamen or a pistil. One or other of the sex organs is all that is necessary to constitute an individual flower, though often both sexes are present and sepals or petals or both, or bracts, enveloping the sex organs. The *Pinaceae* may be said to have flowers only by a wide interpretation of the term, though they have sporophylls and sporangia closely similar to inflorescences.

Foliate. Leaved.

Frond. The leaf of ferns, including the leaf-stalk (stipe) which appears to be a stem.

Fruit. The seed-bearing product of a plant after fertilization, including not only the seeds, but all coats around them and any receptacle, vessel or pod. The term "fruiting" is also extended loosely to include the mature spores or sporangia of pteridophytes.

Gemma(ae). A very small, bud-like body, capable of dropping off and growing asexually.

Geniculate. Literally "bent at the knee," that is, reclining on the ground at the base, and obliquely bent upward at a node.

Glabrate. Becoming glabrous.

Glabrous. Smooth, not hairy at all.

Gland. Any liquid-secreting organ, as a nectary. Many glands exude sticky, resinous, oily or clammy substances; some are entirely internal. Others are large, even petal-like (*Euphorbiaceae*). Certain small protuberances, as those on the petioles of leaves in *Prunus*, *Cassia*, etc., are also called glands.

Glaucous. With a "bloom," generally a dull bluish-white or greenish-white cast upon leaves, stems, or fruits.

Glochidiate. Barbed at the tip.

Glomerate. Of dense, head-like form, or in masses of such form.

Glume. One of two husk-like, empty bracts at the base of the spikelet in grasses.

H. & R. Higley and Raddin, authors of "Flora of Cook Co., Ill., and part of Lake Co., Ind." (Bull. Chicago Acad. Sci., 1897) which contains many reports of plants from the western part of our range and is in some cases the only authority for them.

Halberd-shaped. Of the shape of a battle-axe, having broad basal lobes directed outward.

Herb. A plant with no persistent woody stem above the ground, the tissue soft.

Herbaceous. Having the characters of an herb; or, green and leaf-like.

Hilum. Point of attachment of a seed, marked by a scar.

Hirsute. With coarse hairs.

Hispid. With rigid or bristly hairs.

Immersed. Submerged.

Indusium. A covering of the sorus or fruit-dot in ferns, generally a minute shield-shaped appendage, sometimes the revolute margin of the frond.

Inferior. Lower, or below; said especially of an ovary which is adnate to, or below the limb of a calyx.

Inflorescence. The flowering portion of a plant, especially its method of branching.

Internode. Portion of stem between nodes.

Intr. Introduced (from some exotic flora, implying deliberate importation).

Introrse. Facing inward; said especially of anthers turned to the center of the flower.

Involucel. A secondary involucre, as in *Umbelliferae*.

Involucre. A circle or collection of bracts or leaves surrounding a flower or head or cluster of flowers. In *Compositae* the involucre is like an aggregation of sepals; in *Nyctaginaceae* it resembles a calyx; in *Anemone* it is only a cluster of leaves remote from the flower; in *Umbelliferae* it is a cluster of leaves at the base of the inflorescence. Glands, often with petal-like appendages, constitute an involucre in certain *Euphorbiaceae*. In the Monocotyledones spathes and bract leaves are of an involucral nature and are often so called.

Irregular. Unequal in size, form, or union of similar parts.

Keel. The lowest, usually boat-shaped petal of a leguminous flower; or a ridge, especially on some fruits.

Keeled. Said of leaves which are more or less folded lengthwise.

Laciniate. Slashed into narrow segments.

Lanate. With dense matted wool-like pubescence.

Lanceolate. Long and narrow, acute at tip, broadest above the base; not so narrow as linear.

Leaflet. A single division of a compound leaf.

Legume. The fruit or pod of the *Leguminosae*, which is a simple pistil that has ripened, having a suture on each margin by which it opens. Also, any member of the family *Leguminosae*.

Lemma. A husk-like or membranous bract or floral leaf in grasses, being the lower of the two bracts enclosing the sex organs, as distinguished from the inner bract (palea), and the outer empty glume or glumes.

Lenticel. A breathing pore in the bark, generally a scar-like, small, elliptical, light-colored mark.

Lenticular. Doubly convex or lentil-shaped.

Ligulate. Furnished with a ligule.

Ligule. A thin dry-papery projection from the summit of the sheath in grasses; also the strap-shaped, petal-like limb of a "ray" flower in *Compositae*.

Linear. Long and very narrow, with parallel margins.

Lobe. A segment of an organ.

Lobed. Divided into lobes; having a deep sinus.

Lyrate. Pinnatifid, with large rounded terminal lobe, the terminal leaflet largest.

-merous. Having parts, as 5-merous, meaning the flower arranged dominantly on a plan of five.

Moniliform. Resembling a string of beads.

Mucro. A short abrupt tip.

Muriculate. With very small rough pimply points.

Nat. Naturalized, spreading from an exotic flora, as a waif or weed.

Neutral. Of neither sex, having neither stamens nor pistils.

Node. A joint of the stem, or point from which a branch or leaf arises.

Nut. A hard, non-splitting fruit, 1-celled, 1-seeded (though actually the product of more than 1 carpel), the seed most often being a fleshy or starchy "kernel."

Obconical. Inversely conical.

Obcordate. Inverted heart-shaped.

Oblanceolate. Lanceolate but the broader part near the apex.

Oblate. A solid of somewhat spherical form, flattened on at least one side.

Obovate. Inverted-ovate.

Obpyramidal. Inverted-pyramidal.

Ocrea(ae). A tubular stipule, generally found on the swollen nodes of *Polygonaceae*.

Olivaceous. Of an olive hue or cast.

Ovary. Part of a pistil containing the ovules—the principal cavity of the female organ, situated at the bottom and center of the floral structure.

Ovate. Egg-shaped, the broader end downward.

Ovoid. A solid with an oval outline.

Ovule. Unfertilized seed, generally small greenish-white bodies contained (except in *Pinaceae*) in the ovary.

Palea. The uppermost (innermost) husk or membranous scale which encloses the sex organs in the spikelet of grasses.

Palmate. Lobed or divided in a radial manner, as the ribs of a fan.

Panicle. An irregularly compound, generally loose inflorescence with pedicelled flowers.

Papilionaceous. Literally butterfly-like; said of certain flowers of the *Leguminosae* having the petals, as in the sweet pea, formed into standard, wings, and keel (q. v.).

Papilla(ae). A minute nipple-shaped projection.

Papillose. Bearing papillae.

Pappus. A crown of bristles, chaff or down on the summit of the achene in *Compositae*; it is the much modified remnant of a calyx.

Parasite. A plant deriving its nourishment from other living organisms and living in intimate contact with them.

Parasitic. Having the habits of a parasite.

Pedate. Palmately lobed or divided, the lateral segments 2-cleft, as in leaves of certain violets and buttercups.

Pedicel. The stalk of a single flower in an inflorescence. If the flower is solitary the stalk is a peduncle.

Peduncle. A primary flower-stalk, supporting either an inflorescence or a solitary flower.

Peltate. Shield-shaped and attached beneath near the center, as the leaf of lotus or nasturtium, or the stigma of *Pyrola*.

Perennial. Persisting from year to year, at least the underground parts.

Perfect. Said of flowers having both sexes.

Perfoliate. The bases of opposite leaves meeting, so that the stem appears to pierce the center of a leaf.

Perianth. The floral envelopes around the essential sex organs of a flower, the sepals (calyx) or petals (corolla), or both; used especially of flowers like *Iris* in which calyx and corolla are alike and distinguishable only by position.

Perigynium. The inflated sac enclosing the achene of a *Carex*.

Petal. A division of the corolla, used especially of wholly separate lobes of the corolla.

Petaloid. Petal-like in color or texture. Used especially of sepals or bracts or stamens modified to resemble petals.

Petiole. The stalk of a leaf.

Pilose. Softly hairy, the hairs usually rather long.

Pinna(ae). One of the primary divisions of a compound leaf or frond.

Pinnate. Compound, with leaflets arranged on each side of a common rachis, as the bristles on a quill.

Pinnatifid. Pinnately cleft but not divided to the very base.

Pinnule. A secondary pinna.

Pistil. Seed-bearing organ of a flower—the ovary, stigma, and, when present, the style; the whole female organ.

Pistillate. Having pistils; often used in the sense of a strictly female flower.

Plait. A fold or appendage, especially in the corolla.

Plumose. Having fine hairs on each side (sometimes seen only under a lens), as the pappus of some *Compositae*, or the stigmas of some grasses.

Pod. A dry fruit splitting at maturity; as loosely differentiated from a capsule, a pod is generally larger and thick-walled.

Pollen. The fecundating grains contained in an anther—the essential male cells.

Polygamous. Having some flowers unisexual, others perfect or partially so.

Pome. A fleshy fruit of which the apple is the type.

Procumbent. Trailing on the ground, but not rooting at the nodes.

Proliferous, proliferating. Producing offshoots.

Prothallus. A cellular, usually flat plant growth resulting from the germination of a spore; in particular, the obscure sexual generation of a pteridophyte, giving rise in turn to the typical fern plant.

Puberulence. Minute pubescence.

Pubescence. Hairiness, in particular soft short hairs.

Pubescent. Hairy.

Punctate. Dotted with small depressions or with translucent internal dot-like glands.

Quinate. Five-parted.

Raceme. A simple inflorescence on an elongated axis, the flowers being pedicelled.

Racemose. In racemes.

Rachilla. A secondary axis of the inflorescence, especially the floral axis of the spikelet of grasses and sedges.

Rachis. The axis of a compound leaf, corresponding to the midnerve of a simple leaf. Primary axis of an inflorescence.

Ray (radiate). A branch of an umbel; the marginal flower in the inflorescence of certain *Compositae*, as the apparent "petals" of a daisy. Also said of the branches of the inflorescence, as in *Cyperus*.

-ranked. In rows, as 2-ranked leaves, that is, disposed in 2 vertical lines on the stem.

Receptacle. The expanded termination of a floral axis on which are supported the sex organs and at least some of the floral envelopes; in some cases it enlarges in fruit, forming, for instance, the fleshy part of an apple. In the *Compositae* the receptacle is the disk or cone-like termination of the stem, on which the florets are inserted.

Regular. Having parts uniform in structure, especially a regular flower as contrasted with a 2-lipped or spurred flower.

Repand. With slightly uneven or sinuate margin, the prominences generally somewhat acute.

Reticulate. Crisscrossed, as with a network; used especially of prominently mesh-veined leaves and of fruits or seeds wrinkled in a crisscross way.

Retrorse. Backward, especially of stiff hairs, prickles, etc., which are directed backward from the direction of growth of the shoot.

Revolute. Curled back, especially the margins of leaves or fronds curled under.

Rhizome. A prostrate subterranean stem, resembling roots, but usually with distinct nodes and rooting at the nodes, ascending at the tip, giving rise to roots at the base.

Root. The underground part of a plant which supplies it with nourishment, or more rarely aerial, as on certain vines. Technically distinguished from the stem by its origin at the opposite end of the embryo from the stem, but practically differentiated by its downward growth, its giving rise to rootlets, and the fact that it never gives rise to buds. Also, even when aerial, roots seldom contain chlorophyll. Bulbs, tubers, corms, rhizomes and rootstocks, though subterranean, are all parts of the stem, not of the root; the apparent root of ferns, especially, is only a stem. But tuberoids are thickenings of the true roots.

Rootstock. Same as rhizome.

Rugose. Wrinkled or crinkly, well exemplified by the leaf of the well known *Rosa rugosa.*

Sac. A cavity, especially the end of the spur of certain petals or sepals in irregular flowers; also a pollen-bearing cell of an anther.

Saccate. Sack-shaped.

Sagittate. Arrow-shaped, the basal lobes directed downward.

Salverform. Salver-shaped; having a long slender tube and flaring lobes.

Samara. A winged fruit, not naturally splitting, as of the maple.

Saprophyte. A plant deriving nourishment from dead plants.

Scabrous. Rough, scratchy, harshly hairy.

Scale. A term used variously for different organs or appendages. Often employed in connection with very much reduced stem leaves, especially if not leaf-like. Small scurfy appendages of the epidermis are also called scales, and in particular the term is used in connection with the floral envelopes of grasses and sedges and the chaffy pappus of some *Compositae.* Also, separate leaves of the involucre in *Compositae,* appendages on the filaments of *Cuscuta,* etc.

Scape. A peduncle arising from the ground, appearing like a stem but without leaves, though sometimes bearing scales or bracts or a whorl of involucral leaves.

Scarious. Thin, dry, papery, not green.

Scurfy. Having dull-colored, easily deciduous, small scales.

Seed. The ripened ovule and its coat, sometimes confused with the more comprehensive organs classed as fruits. Except in the conifers the seeds are enclosed in fruit. Occasionally small dry fruits, closely investing the seeds, such as achenes, or the "grains" of grasses, are mistaken for the true seeds. Seeds differ from the analogous spores of the non-flowering plants in containing an embryonic plant.

Sepal. One division of the calyx, used especially when the calyx is cleft to the base into separate segments. While generally green, sepals may be petal-like, especially in the absence of petals, it being considered that if only one series of floral envelopes is present, that series is the calyx; in a few families (e. g. *Papaveraceae*) the sepals are deciduous as buds expand, hence easily overlooked.

Serrate. Having sharp, forward-pointing teeth.

Serrulate. Minutely serrate.

Sessile. Not stalked, seated directly on the axis of growth.

Sheath. A tubular envelope, as the lower part of the leaf, surrounding the stem in grasses; also the fringe-like border surrounding the nodes in *Equisetum,* and the tubular part of the ocreae of *Polygonaceae.*

Simple. Not compound (ovary, leaf, etc.); or, not branched (stem, inflorescence).

Sinuate. With slightly wavy border, the sinuses and prominences not acute.

Sinus. The cleft between two prominences, as between the lobes of a leaf having a heart-shaped base.

Sorus. A heap or cluster, applied to the fruit-dots or collections of sporangia in ferns.

Spadix. A spike with a fleshy axis, used also to denote the spike and the flowers compacted upon it, especially in *Araceae.*

Spathe. A large bract-leaf, or pair of bracts, enclosing or subtending an inflorescence, prevalent in the Monocotyledones, especially modified in many *Araceae* into petal-like organs furled around the spadix (as the "pulpit" part of Jack-in-the-pulpit).

Spatulate. Apex broad, base gradually narrowed.

Spheroidal. Of generally spherical shape, often somewhat flattened.

Spike. A simple elongated inflorescence, differing from a raceme in bearing sessile flowers; applied also to a compact cluster of spikelets of grasses and sedges.

Spikelet. A small or secondary spike; in particular a floret or florets of grasses or sedges, with the various bracts or scales accompanying, forming a little unit of inflorescence (see further under description of grass family).

Spinulose. Having little spines or rigid processes.

Sporangium. A spore-case.

Spore. The asexual reproductive unit of ferns. Generally minute and pollen-like (but analogous to seed, though without embryo).

Sporophyll. A spore-bearing leaf or bract, used especially in connection with the bracts and spikes or "cones" of *Equisetum* and *Lycopodium.* The scales of a pine cone are also sporophylls and even the stamens and pistils of a true flower are special modifications of sporophylls though not generally so called.

Stamen. A pollen-bearing organ, consisting of the stalk or filament, and the anther or true pollen-bearing organ. A single stamen, with or without floral envelopes, may constitute a male flower (as in *Araceae, Typhaceae, Gramineae, Euphorbiaceae,* etc.). Stamens in bisexual flowers usually occupy a position outside the female organs, but interior to the petals. In some primitive families in which the organs of the flowers are all merely imperfectly differentiated sporophylls, stamens may closely resemble petals (as in waterlilies) and in double flowers or abnormal ones, stamens may be converted into petals.

Staminate. Bearing stamens; in particular, flowers or inflorescences or plants wholly male.

Staminodium (*a*). An abortive stamen, generally consisting only of a filament, and this often irregular in shape.

Standard. The large posterior (upper) petal, generally more or less erect, of a papilionaceous flower.

Stellate. Branched like the points of a star; used of pubescence of certain genera of plants; stellate pubescence is generally not visible as such to the naked eye.

Sterile. Not reproducing. Applied to a frond or shoot, not having spores or flowers; applied to flowers, not setting seed, or, more rarely, not having female reproductive organs, being wholly male; applied to a stamen, not having anthers, or fully developed anthers, being a staminodium or sterile filament.

Stigma. The surface at the summit of an ovary especially modified for receiving the fecundating pollen. Generally it is somewhat sticky and has a definite form; but it may be merely an indefinite sort of area; frequently elevated on a style.

Stipe. A stalk, especially a very small stalk such as that on which the ovary is sometimes elevated; also, the stalk (apparent stem) of a fern leaf.

Stipel. A secondary stipule, such as subtends a leaflet.

Stipellate. Provided with stipels.

Stipitate. Raised on a slender little foot or stipe, or topped with a slender stipe.

Stipular. Pertaining to, or in the place of stipules.

Stipule. Generally a little, leaf-like appendage, accompanying a branch, leaf-stalk, etc., ordinarily but not always beneath the branch or petiole.

Stipulate. Having stipules.

Stolon. A runner or basal shoot.

Stoloniferous. Bearing stolons.

Striate. Literally "scratched"; marked with fine lines or furrows.

Style. The elevating column of a stigma; frequently the style is branched, which often represents a union of styles; in *Iris* the styles are almost petal-like.

Sub-. (as a prefix) less than, approaching the condition of, almost.

Subulate. Long, very narrow, and firm.

Superior. Applied to the ovary, above or free from the calyx.

Suture. A line along which a carpel or fruit splits naturally.

Terete. Roundish.

Ternate. 3-divided, or compound on a plan of three.

Thallus. Flat body, used especially of the little leaf-like floating fronds of *Lemnaceae,* and the vegetative parts of *Cactaceae.*

Thyrse. A contracted, compound panicle.

Tomentose. Pubescent with soft, frequently white, hairs.

Tomentulose. Minutely tomentose.

Tomentum. A soft, matted pubescence.

Trigonous. Three-sided or -angled.

Tripinnate. Thrice pinnate.

Tripinnatifid. Thrice pinnate and again pinnate.

Tuber. A subterranean storage organ, an appendage of the stem, not of the root.

Tubercle. A small tubercle or tuber-like body, sometimes subterranean, sometimes merely an excrescence on an organ, sometimes a special hard cap-like body on the achene of the *Cyperaceae.* Also grain-like bacterial colonies on the roots of *Leguminosae.*

Tuberculate. Having tubercles, or of the form of tubercles.

Tuberoid. Subterranean storage organ, generally small, a fleshy thickening of the root, not of the stem.

Tuberous. Having tubers, or of tuber-like form.

Tumid. Swollen; convex; plump.

Turbinate. Inversely conical, like a top.

Umbel. An inflorescence of which the branches all radiate from the same point forming a umbrella-like cluster.

Umbellate. Disposed in an umbel.

Umbellet. A little or secondary umbel.

Unisexual. Of one sex only.

Utricle. A bladdery, dry, capsule-like fruit.

Valve. A line along which a fruit naturally splits.

Vascular. Pertaining to the vessels or ducts of stem and leaf providing fibrous or woody skeleton of ferns and flowering plants.

Vascular bundles. The collections of tubes commonly seen as a definite ring in cross-sections of Dicotyledones, but in Monocotyledones scattered throughout the stem.

Verticel. A whorl; three or more branches, leaves, or pedicels arising circularly from one node.

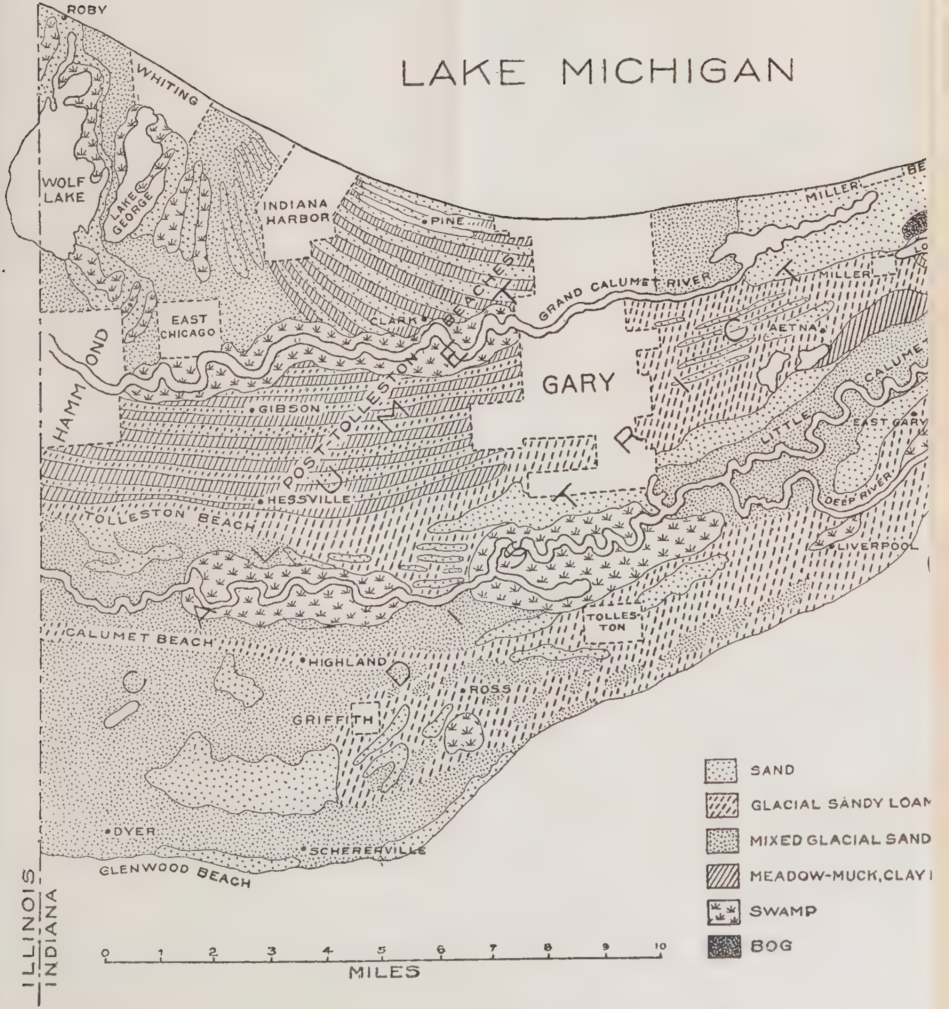
Verticillate. Whorled.

Villous. Bearing long hairs.

Wing. A membranous expansion bordering or surrounding any organ, as winged stems, petioles, etc. Winged fruits sometimes are considered to include any fruits adapted to wind distribution. More strictly a fruit wing is an appendage on the seed resembling an insect wing, as in maple or ash. Also used to denote the lateral petals of a papilionaceous flower.

Xerophyte. A plant growing in very dry or desert-like conditions; more especially one showing a vegetative adaptation to such conditions, as a cactus.

Xerophytic. As of dry, desert-like environment, or behaving as a xerophyte.


LAKE MICHIGAN
ROBY
WHITING
WOLF LAKE
LAKE GEORGE
INDIANA HARBOR
PINE
EAST CHICAGO
HAMMOND
CLARK
GIBSON
HESSVILLE
POST TOLLESTON BEACHES
GRAND CALUMET RIVER
GARY
MILLER
MILLER
BE
LO
AETNA
LITTLE CALUMET
EAST GARY
DEEP RIVER
LIVERPOOL
TOLLESTON BEACH
CALUMET BEACH
TOLLESTON
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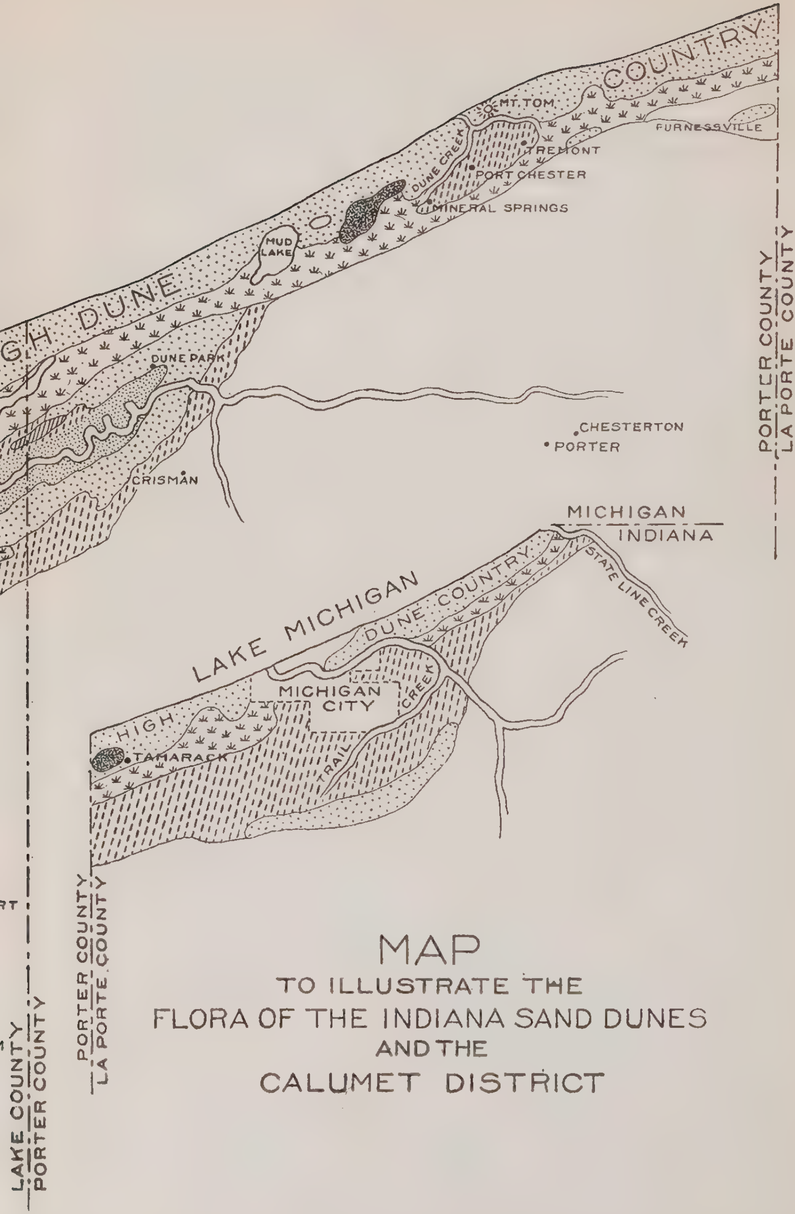
SWAMP
BOG


GH DUNE COUNTRY
MT. TOM
TREMONT
PORT CHESTER
MINERAL SPRINGS
DUNE CREEK
MUD LAKE
FURNESSVILLE
DUNE PARK
CRISMAN
CHESTERTON
PORTER
PORTER COUNTY
LA PORTE COUNTY
MICHIGAN
INDIANA
STATE LINE CREEK
LAKE MICHIGAN
HIGH DUNE COUNTRY
MICHIGAN CITY
TRAIL CREEK
TAMARACK
PORTER COUNTY
LA PORTE COUNTY
LAKE COUNTY
PORTER COUNTY
RT

MAP
TO ILLUSTRATE THE
FLORA OF THE INDIANA SAND DUNES
AND THE
CALUMET DISTRICT

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Y0-CLA-691